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ADVANCED DISTRIBUTED SIMULATION TECHNOLOGY II (ADST II)

**DELIVERY ORDER 0047
MODSAF - THREAT ENHANCEMENT
CDRL AB01**

FINAL REPORT



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**FOR: NAWCTSD/STRICOM
12350 Research Parkway
Orlando, FL 32826-3224
N61339-96-D-0002
DI-MISC-80711**

**BY: Lockheed Martin
ADST-II Team
P.O. Box 780217
Orlando, FL 32878-0217**

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13. ABSTRACT (<i>Maximum 200 Words</i>) . This Final Report documents the requirements development phase for the ModSAF Threat Enhancement Delivery Order (DO 47) that is currently being performed for the Advanced Distributed Simulation Technology Program II (ADST II). The ModSAF Threat Enhancement development effort consists of two phases, a requirements development phase and an implementation phase. The purpose of the requirements development phase is to produce a Software Requirements Specification (SRS) and a Conceptual Model (CM). This Final Report, along with the appendices containing the SRS and CM, forms the basis for performing the implementation phase.				
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1. Introduction

This Final Report documents the requirements development phase for the ModSAF Threat Enhancement Delivery Order (DO 47) that is currently being performed for the Advanced Distributed Simulation Technology Program II (ADST II).

The ModSAF Threat Enhancement development effort consists of two phases, a requirements development phase and an implementation phase. The purpose of the requirements development phase is to produce a Software Requirements Specification (SRS) and a Conceptual Model (CM). This Final Report, along with the appendices containing the SRS and CM, forms the basis for performing the implementation phase.

2. Background

ModSAF behavior development for ADST II to date has focused on U.S. doctrine and tactics. The ModSAF Threat Enhancement development effort is intended to provide tactically realistic behaviors for threat mechanized infantry, armor, fire support, and air defense units at the company and platoon levels, as well as for dismounted ATGM platoons and squads.

APPENDIX A: Conceptual Model

Refer to the ModSAF Threat Enhancement Conceptual Model, ADST-II-MISC-MODSAF-9700341 for the conceptual model of the ModSAF Threat Enhancement system.

APPENDIX B: Software Requirements Specification

Refer to the ModSAF Threat Enhancement Software Requirements Specification, ADST-II-MISC-MODSAF-9700342 for the software requirements of the ModSAF Threat Enhancement system.

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ADVANCED DISTRIBUTED SIMULATION TECHNOLOGY II (ADST II)

**DELIVERY ORDER 0047
MODSAF - THREAT ENHANCEMENT
CDRL AB01**

FINAL REPORT APPENDIX A

CONCEPTUAL MODEL



FOR: NAWCTSD/STRICOM
12350 Research Parkway
Orlando, FL 32826-3224
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BY: Lockheed Martin
ADST-II Team
P.O. Box 780217
Orlando, FL 32878-0217

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1. Title/Hierarchy/Author

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Author	SAIC

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4. ModSAF System Requirements

Referenced ModSAF System Requirements
???

5. Overview

ModSAF behavior development has to date focused on U.S. doctrine and tactics. This development effort is intended to provide tactically realistic behaviors for threat mechanized infantry, armor, fire support, and air defense units at the company and platoon levels, as well as for dismounted anti-tank guided missile (ATGM) platoons and squads. The behavior development will draw upon the Combined Arms Tactical Trainer (CATT) R-TASK database, using the threat Combat Instruction Sets (CISs) defined in that database as a basis for implementing threat behaviors in ModSAF.

6. Referenced Documents

- CATT R-TASK Database, Resource Consultants Inc., Version dated 3 Apr 97
- Threat Data Requirements Specification, ADST-II ModSAF Threat Enhancement Delivery Order, 18 Jul 97, ADST-II-MISC-MODSAF-9700313
- Software Development Plan for the ModSAF Program, Revision C, 5 Aug 97, ADST-II-CDRL-011R-9600167-C

7. Units or Entities

This model will add the following new units to the existing ModSAF units:

- Motorized Rifle Squad:
 - 1 RPK-74 (machine gun)
 - 1 RPG-22 (grenade launcher)
 - 4 AKM Avtomat Kalashnikov (assault rifle)
- ATGM Section:
 - 2 AT4/Spigot (missile launchers)
 - 1 RPG-22 (grenade launcher)
 - 3 AKM Avtomat Kalashnikov (assault rifles)
- BMP1 ATGM Squad:
 - 1 BMP1 vehicle

- 1 ATGM Section
- BMP2 ATGM Squad:
 - 1 BMP2 vehicle
 - 1 ATGM Section
- BTR80 ATGM Squad:
 - 1 BTR80 vehicle
 - 1 ATGM Section
- BMP1 Anti-Tank Platoon:
 - 3 BMP1 ATGM Squads
- BMP2 Anti-Tank Platoon:
 - 3 BMP2 ATGM Squads
- BTR80 Anti-Tank Platoon:
 - 3 BTR80 ATGM Squads
- BMP1 - SA-16 Air Defense Platoon:
 - 3 BMP1 vehicles
 - 3 SAM Squads
- BMP2 - SA-16 Air Defense Platoon:
 - 3 BMP2 vehicles
 - 3 SAM Squads
- 2S6 Air Defense Battery:
 - 3 2S6 air defense platoons
 - 1 Battery Headquarters Vehicle (BTR60PU)

This model will modify the following existing ModSAF units:

- BMP1 Motorized Rifle Platoon:
 - 3 BMP1 vehicles
 - 3 Motorized Rifle Squads
- BMP2 Motorized Rifle Platoon:
 - 3 BMP2 vehicles
 - 3 Motorized Rifle Squads
- BTR80 Motorized Rifle Platoon:
 - 3 BTR80 vehicles
 - 3 Motorized Rifle Squads
- Self Propelled Howitzer Battery:
 - 6 2S1 122mm self-propelled howitzers
 - 1 1V13 fire direction center vehicle
 - 1 1V14 command observation post vehicle
 - 6 URAL-375 cargo carrier trucks
- SAM Squad:
 - 3 SA-16 Teams
- 2S6 Air Defense Platoon:
 - 2 2S6 air defense vehicles

8. Tactics & Behaviors

New behaviors will be developed (or, in some cases, adapted from existing behaviors) for a variety of threat combat units. Each behavior will be patterned after the CIS for that mission in the CATT-Threat database. The CISs to be implemented are as follows:

- **Motorized Rifle Platoon**
 - ◊ **Traveling**

- ◇ Conduct Tactical Road March
- ◇ Assault an Enemy Position
- ◇ Conduct Fire Engagement
- ◇ Occupy Temporary Defensive Position
- ◇ Dismount Vehicle
- ◇ Remount Vehicle
- ◇ Take Air Defense Measures
- ◇ Actions when under Incoming Indirect Fire
- ◇ Conduct Defense
- Motorized Rifle Company
 - ◇ Traveling
 - ◇ Conduct a Tactical Road March
 - ◇ Attack from the March
 - ◇ Assault an Enemy Position
 - ◇ Execute a Fire Engagement
 - ◇ Occupy a Temporary Defensive Position
 - ◇ Conduct a Meeting Engagement
 - ◇ Take Air Defense Measures
 - ◇ Take Actions on Incoming Artillery Fire
 - ◇ Conduct a Defense
- Tank Platoon
 - ◇ Traveling
 - ◇ Conduct Tactical Road March
 - ◇ Execute a Fire Engagement
 - ◇ Assault an Enemy Position
 - ◇ Take Air Defense Measures
 - ◇ Actions when under Incoming Indirect Fire
 - ◇ Execute Actions on Contact
- Tank Company
 - ◇ Traveling
 - ◇ Conduct a Tactical Road March
 - ◇ Assault an Enemy Position
 - ◇ Take Air Defense Measures
 - ◇ Take Actions on Incoming Artillery Fire
 - ◇ Execute Actions on Contact
- ATGM Squad
 - ◇ Occupy a Defensive Position
 - ◇ Conduct a Defense
 - ◇ Air Defense Measures
- Anti-tank Platoon
 - ◇ Occupy a Defensive Position
 - ◇ Conduct a Defense
 - ◇ Air Defense Measures
- SP Howitzer Battery
 - ◇ Conduct Tactical Road March
 - ◇ Occupy Firing Position
 - ◇ Conduct Unobserved Fire Mission
 - ◇ Take Air Defense Measures
- Air Defense Platoon (SA-16)
 - ◇ Conduct Tactical March
 - ◇ Occupy an AD Firing Position
 - ◇ Engage an Aerial Target

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- ◊ Take Actions on Enemy Incoming Indirect Fire
- Air Defense Battery (2S6)
 - ◊ Conduct Tactical Road March
 - ◊ Occupy Firing Position
 - ◊ Employ Target Acquisition Radar
 - ◊ Provide Air Defense Coverage
 - ◊ Engage an Aerial Target
 - ◊ Actions on Incoming Indirect Fire

In addition, movement behaviors will be implemented for the ATGM Squad and Anti-tank Platoon, since **Traveling** and **Conduct Tactical Road March** CISs are conspicuously absent for these units.

The following simplifying assumptions will be made in the implementation of each CIS in ModSAF. These assumptions are all consistent with the current approach for modeling U.S. force behaviors in ModSAF:

1. Instructions in the CIS for a maneuver company (Motorized Rifle Company or Tank Company) that refer to attached anti-tank (AT), automatic grenade launcher (AGL), mortar, air defense, or engineer units will not be implemented. The logic required to detect the variety of possible attached units and enact the appropriate behaviors for them would require a substantial effort to produce and would yield limited benefits in threat behavior capability representation. Instead, attached units will be created independently, and the operator will need to independently task them in such a way as to accomplish the desired coordination with the company to which they are intended to be attached.
2. Instructions in the CIS that call for specification of the desired time of arrival (rendezvous) of a unit at a designated point or area will be implemented as instructions to move at a specified average speed, instead. This avoids the difficulty of implementing an algorithm to continually predict the time required to cover the remaining portion of a unit's route and then modify its speed as necessary to meet its arrival time requirement.
3. CIS instructions that pertain to coordination of artillery fires with the actions of the maneuver force will not be implemented within the unit behavior. To do so would call for a very complex interface between the maneuver unit's behavior and that of the associated fire support units. Rather, the ModSAF operator acting as a fire support officer will be required to order the appropriate actions to coordinate artillery fires with the maneuver unit.
4. Some CISs call for coordination of fires within a platoon, with the platoon leader assigning specific targets to each subordinate. The ModSAF target assessment logic does not currently accommodate this type of fire coordination (for either friendly or enemy forces), and a substantial effort would be required to add that capability. Also, a performance price would be paid to implement such a capability, due to the increased computational overhead and the network traffic generated by the target assignment messages and responses. Therefore, the fire coordination feature will not be implemented in ModSAF. It should be noted that there is a limited fire coordination capability in ModSAF whereby vehicles notify one another of targets currently being engaged, and the target selection process avoids selecting a target being engaged (unless no other target is available) by another vehicle. This feature will be retained as part of the threat behavior implementation.

The following existing ModSAF capabilities will be utilized in the implementation of the CISs:

- Order execution is triggered by any one of the following:
 - a. Completion of the currently executing order
 - b. Encountering a map point control measure
 - c. Encountering a map line control measure
 - d. Encountering a map area control measure
 - e. Receipt of a contact report from a specified unit
 - f. Receipt of a spot report from a specified unit
 - g. Receipt of a reporting message from a specified unit

- h. Expiration of a time duration
- i. Expiration of a time of day
- j. Detection of a flare signal of a specified color
- k. Detection of a smoke signal of a specified color
- Control of unit engagements is based upon the following fire permissions:
 - a. Hold (firing forbidden)
 - b. Tight (fire only if fired upon)
 - c. Free (fire at will)
- Unit movement is based upon the following:
 - a. Route
 - b. Travel type (Roadmarch or CrossCountry)
 - c. Formation
 - d. Sub-formation
 - e. Movement speed
 - f. Catch-up speed
 - g. Spacing
 - h. Sub-spacing
 - i. Dismounted infantry positional offset from vehicle
 - j. Dismounted infantry speed
- Unit formations and sub-formations are:
 - a. Column
 - b. Staggered column
 - c. Echelon left
 - d. Echelon right
 - e. Line
 - f. Wedge
 - g. Vee

In implementing the CISs, all references to specific physical quantities (threshold range, desired speed, vehicle spacing, etc.) will be encoded as parametric values to be drawn from data files associated with the vehicles executing the behaviors, rather than being built explicitly into the computer program logic. This approach maximizes the flexibility and usefulness of the behavior models.

A number of the CISs listed above are common to more than one unit and are sufficiently similar across units to permit implementation as common behaviors (i.e., one behavior model can be developed and applied to all units that call for the same mission). The development approach for those common behaviors are presented in the following subsection. Implementation approaches for the remaining CISs are given in subsequent subsections, with one subsection devoted to each combat unit.

8.1 Common Behaviors

8.1.1 Traveling

The **Traveling** CIS requirements are quite similar to existing ModSAF capability and will not require the development of a new behavior model. However, the existing behavior will need to be enhanced to accommodate the requirement in the CIS to orient the vehicles' turrets toward the expected enemy direction. The current behavior assumes that the search sectors are centered around the direction of movement of the unit. This requirement will be satisfied by the addition of a task parameter to specify the expected direction of the enemy (i.e., the direction on which the search sectors of the unit should be centered). The task logic will be enhanced to use the input threat direction, if supplied, to center the search

sectors. If the threat direction is not provided, the task will default to the direction of movement for centering search sectors.

8.1.2 Conduct Tactical Road March

The existing ModSAF code is capable of modeling all the **Conduct Tactical Road March** and **Conduct Tactical March** CISs for all the specified combat units. However, the column formation called for in the CIS for the Motorized Rifle Company is unique, and a new formation specification will have to be added to the ModSAF formation database to accommodate it.

8.1.3 Occupy Defensive Position

The existing ModSAF behavior model for occupying a defensive position can be adapted to accommodate the platoon **Occupy a Temporary Defensive Position** CIS for the Motorized Rifle Platoon, the **Occupy a Defensive Position** CIS for the ATGM Squad and Anti-tank Platoon, and the **Occupy an AD Firing Position** CIS for the Air Defense Platoon (SA-16). The existing logic accepts a desired position (given as a line or a piecewise-linear curve) and the expected direction of enemy advance as input. It then determines covered and concealed positions with good visibility in the desired direction, and moves the vehicles/infantry into those positions. It will also, if requested, determine alternate firing positions for each element (vehicle, dismounted squad, or dismounted ATGM team) in the unit.

The behavior will be enhanced to provide a dismount option, which, if activated, will automatically dismount vehicles (by invoking the **Dismount Vehicle** CIS) at a specified distance from the firing position. This is needed to satisfy dismount requirements in the **Occupy an AD Firing Position** CIS for the Air Defense Platoon (SA-16).

The behavior will also be enhanced to incorporate task inputs, assignable from the task editor, for the number of firings to be conducted at the primary (or alternate) firing position before moving to the alternate firing position (or back to the primary firing position). The behavior will keep track of the number of firings conducted from the current position and will move to the alternate (or primary) position when the specified number of firings have been conducted. If the number of firings is specified as zero, or is not specified at all, no limit of firings will be imposed at either firing position.

8.1.4 React to Incoming Indirect Fire

A single behavior model will be developed to address all the indirect fire reaction CISs specified for the various units (i.e., Motorized Rifle Platoon, Motorized Rifle Company, Tank Platoon, Tank Company, Air Defense Platoon (SA-16), and Air Defense Battery (2S6)). Note the CIS titles vary somewhat from unit to unit (**Actions on Incoming Indirect Fire**, **Actions When Under Incoming Indirect Fire**, **Take Actions on Incoming Artillery Fire**, etc.), but all call for the same reactions to attack by enemy indirect fire.

This behavior will be implemented as a background task that executes continuously on each unit, monitoring for the impact of enemy indirect fire munitions within a 1 km radius of any vehicle in the unit. When a munition satisfying the criterion impacts, the unit will be placed in a reactive state. The behavioral effects of that state are to increase their vehicle spacings (and platoon spacings, for company units) by 50% and to increase their movement speed by 50%, when the unit is moving; there is no effect when the unit is stationary. It should be noted that the CISs also call for all crew members to return to the vehicles and for the vehicles to "button up", but these actions are not applicable to ModSAF, since crew members are not explicitly modeled.

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The task will continue to monitor enemy munition impacts during the reactive state and will terminate the reaction when either of the following criteria is met:

1. no munitions impact within 1 km of any vehicle in the unit for a period of 3 minutes, or
2. no munitions impact within 500 m of any vehicle in the unit for a period of 3 minutes, and of those munitions impacting between 500 m and 1000 m, the most recent impact is no more than 100 m closer to any vehicle in the unit than the prior one.

8.1.5 React to Air Attack

A single behavior model will be developed to address all the reaction-to-air-attack CISs specified for the various units (i.e., Motorized Rifle Platoon, Motorized Rifle Company, Tank Platoon, Tank Company, ATGM Squad, Anti-tank Platoon, and SP Howitzer Battery). The relevant CISs for the ATGM Squad and Anti-tank Platoon are titled **Air Defense Measures**; for all other units the CIS title is **Take Air Defense Measures**.

This behavior will be implemented as a background task that executes continuously on each unit, monitoring the enemy vehicles spotted and the detonation of enemy direct fire projectiles in the vicinity of the unit. When an enemy aircraft is spotted, or a projectile launched from an enemy aircraft impacts in the vicinity of the unit, and the enemy aircraft is at a range of less than 2 km and flying at an altitude of less than 4000 feet, the unit is placed in a reactive state and its currently assigned mission is interrupted. The unit reports the contact with enemy aircraft to its commander. The following actions are then performed:

1. If on the march, the platoon will:
 - a. increase speed by 50% of the current speed, and
 - b. increase spacing by 50% of the current spacing.
2. If stationary, vehicles will maintain position.
3. Fire permission is set to "Free".
4. One of two methods of conducting fire against aerial targets is used.
 - a. Firing on a path method is used when enemy aircraft appears suddenly within a 500 m range. The target is led by 20 m for each 20 m/s of aircraft crossing speed (i.e., the component of the aircraft's velocity in the direction perpendicular to the observer's line of sight). The aircraft's crossing speed will be rounded to the nearest multiple of 20 m/s for purposes of this calculation, to avoid unrealistically accurate estimates of desired aimpoint. Long burst of fire (10-15 rounds) are used, and fire is constant.
 - b. Covering fire method is used when attacking aircraft is at a range of 500 to 2000 meters. Gunner uses tracking sensor to aim the gun at the target. Short bursts of fire (5-7 rounds) are used, and fire is constant.

The reactive behavior continues until the aircraft is destroyed or is no longer visible, at which time the results of the engagement are reported to the commander (friendly losses, enemy destroyed), and the previously interrupted mission is resumed.

8.1.6 React to Enemy Ground Force Contact

A number of the CISs are designed to be reactions to contact with enemy ground forces. The type of reaction to be executed varies, depending on the type of mission being executed and the perceived size and composition of the enemy force encountered. The ModSAF implementation of these CISs will provide a single behavior to perform the monitoring function, which will then trigger the appropriate reaction when enemy contact occurs. The CISs that describe reactions to enemy contact include: **Conduct a Defense** for the Motorized Rifle Platoon, Motorized Rifle Company, ATGM Squad, and Anti-tank Platoon; **Execute Actions on Contact** for the Tank Platoon and Tank Company; **Conduct Fire Engagement** for the

Motorized Rifle Platoon; **Execute a Fire Engagement** for the Motorized Rifle Company and the Tank Platoon; and **Conduct a Meeting Engagement** for the Motorized Rifle Company. The **Conduct a Meeting Engagement** CIS for the Motorized Rifle Company is treated separately as an individual behavior in Section 8.3.4. The **Conduct Fire Engagement** for the Motorized Rifle Platoon and the **Execute a Fire Engagement** for the Motorized Rifle Company may also be executed as deliberate, planned missions (i.e., not reactions), and they are treated separately as individual behaviors in Sections 8.2.3 and 8.3.3, respectively. The remaining CISs in the list above are incorporated into the common behavior described below.

The reactive behavior will consist of four distinct steps: (1) monitoring enemy contact, (2) estimating size and composition of enemy force, (3) determining the appropriate reaction and invoking it, and (4) terminating the reaction based on satisfaction of termination criteria.

The first step will be accomplished by continually querying the unit's background task that maintains a list of enemy platforms detected and enemy platforms that fire at its subordinate vehicles (or dismounted squads). As soon as this list, known as the contact list, is non-empty, a clock is started to keep track of the time since enemy contact was detected. When that clock reaches a specified time (given in the data file for the vehicle executing the behavior) for evaluation of the threat, the enemy force size/composition estimation algorithm is executed. By using an evaluation time delay, the behavior is able to collect information on other enemy systems that may be part of the enemy unit that was initially contacted, prior to making a decision regarding the appropriate reaction.

The size and composition of the enemy force is estimated by accessing the contact list and counting the number of enemy platforms on it. Threshold sizes for platoon, company, and battalion organizations will be provided as parametric values in the data file for the vehicle executing the behavior. If the number of enemy vehicles on the contact list exceeds the specified size for a company, the enemy will be assumed to be a battalion; if the number exceeds the specified platoon size but not the battalion size, it will be assumed to be a company; otherwise, it will be assumed to be a platoon. Similar thresholds will be provided for dismounted targets to be classified as squad or platoon sized units. The list of acquired enemy platforms will then be accessed to estimate the enemy unit type. Each acquired target for which the acquisition level is "recognition" or "identification" will be classified according to its vehicle type as either a main battle tank, light tank or armored fighting vehicle (AFV), dismounted ATGM, or other. Targets acquired at levels below "recognition" are excluded from this process, because the unit would not have sufficient knowledge to assign those targets to classes. The number of acquired targets in each class will be tallied, and the class with the highest number of acquired targets will be taken as the unit type. The perceived enemy force size and type will then be used to determine the appropriate reaction.

One of three reactions will be selected, based on a comparison of the enemy force's perceived size and type with the reacting unit's own size and type. The possible reactions and associated force strength comparisons are as follows:

- Defend - enemy force is considered to be of superior or equal strength
 - Unit's current mission is interrupted
 - Fire permission is set to "Free".
 - **Occupy Defensive Position** behavior (described in Section 8.1.3) is executed, with the reacting unit's current location given as the desired position to occupy.
- Attack - enemy force is considered inferior, but a significant threat to reacting unit
 - Unit's current mission is interrupted
 - Fire permission is set to "Free".
 - The appropriate **Assault an Enemy Position** CIS for the reacting unit is executed.
- Engage by Fire - enemy force is sufficiently inferior to be of no significant threat to reacting unit
 - Fire permission is set to "Free".
 - Search sectors are shifted toward the detected enemy force.

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The following table identifies the reaction selected for each combination of own unit size/type and perceived enemy force size/type. The "Attack" reaction is identified in the table by the label "Att", the "Defend" reaction is represented as "Def", and the "Engage by Fire" reaction is identified by "EF".

	Enemy Unit Type and Size										
	Main Battle Tank			Light Tank/AFV			Dismounted ATGM		Other		
Own Unit	Plt	Co	Bn	Plt	Co	Bn	Squad	Plt	Plt	Co	Bn
MR Plt	Def	Def	Def	Def	Def	Def	Att	Def	EF	EF	EF
MR Co	Att	Def	Def	Att	Def	Def	Att	Def	EF	EF	EF
Tank Plt	Def	Def	Def	Att	Def	Def	Att	Def	EF	EF	EF
Tank Co	Att	Def	Def	Att	Att	Def	EF	Att	EF	EF	EF
AT Squad	Def	Def	Def	Def	Def	Def	Def	Def	EF	EF	EF
AT Plt	Def	Def	Def	Def	Def	Def	Def	Def	EF	EF	EF

There is one exception to this table. If a Motorized Rifle Company is executing **Conduct a Tactical Road March** at the time of enemy contact, and the enemy force is considered a significant threat to the company, the **Conduct a Meeting Engagement** CIS will be executed.

The behavior will continue monitoring enemy contact during the reaction. If the enemy force is perceived to have been destroyed or retreated, the following actions will be taken:

1. The reaction will be stopped.
2. The fire permission will be reset to its value prior to initiating the reaction.
3. The number of enemy platforms destroyed (by type) and the friendly losses will be reported to the unit's commander.

The criterion for deciding that the enemy force has been destroyed or has retreated is that, for a specified period of time (defined in the data file for the vehicle executing the behavior), no enemy fire is received and all targets on the acquired target list are assumed dead. A target is assumed dead if it is destroyed or flaming (as indicated by the appearance bits of its entity state PDU), or if it has not moved or fired within the last 30 seconds.

8.2 Motorized Rifle Platoon

8.2.1 Dismount Vehicle

The existing ModSAF behavior model for vehicle dismount will be used to implement this CIS. However, the model, as currently configured, does not impose a significant time delay for the completion of the dismount (i.e., dismounted infantry appear beside the vehicle within a few seconds of issuing the dismount order). The behavior will be modified to add a time delay that is defined in the data file for the vehicle being dismounted. This will permit the dismount time to be varied by vehicle type.

8.2.2 Remount Vehicle

The existing ModSAF behavior model for vehicle remount will be used, without any modification required, to implement this CIS.

8.2.3 Conduct Fire Engagement

A new behavior model will be developed to address the **Conduct Fire Engagement** CIS. The behavior will provide a task editor to accept the following inputs from the operator:

1. formation
2. firing position (line or piecewise linear curve)
3. target location (point)
4. movement speed

The behavior will change the fire permissions for the platoon to "Free." A **Traveling** CIS will be invoked to move the vehicles in the specified formation at the specified speed toward the firing position. The **Occupy a Temporary Defensive Position** CIS will then be executed to calculate covered and concealed positions for each vehicle and move the vehicles to those positions. Once the vehicles have occupied their positions, a radio message will be generated on the company net, indicating that the vehicles are in position. The "Free" fire permission will allow engagement of any encountered enemy.

The behavior will continuously monitor enemy contact. If the enemy force is perceived to have been destroyed or retreated, the following actions will be taken:

1. The fire permission will be reset to its value prior to initiating the reaction.
2. The number of enemy platforms destroyed (by type) and the friendly losses will be reported on the company net.
3. The behavior will be terminated.

The criterion for deciding that the enemy force has been destroyed or has retreated is the same as that described in Section 8.1.6.

8.2.4 Assault an Enemy Position

A new behavior model will be developed to address the **Assault an Enemy Position** CIS. The behavior will provide a task editor to accept the following inputs from the operator:

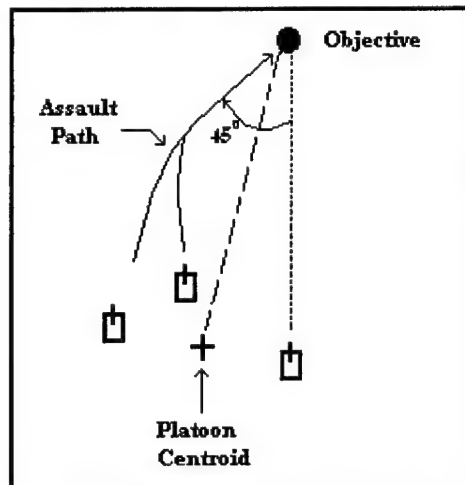
1. objective position (point)
2. platoon formation
3. vehicle spacing
4. assault speed
5. mounted/dismounted assault switch
6. squad formation (if dismounted assault is specified)
7. squad spacing (if dismounted assault is specified)
8. dismount line (if dismounted assault is specified)
9. assault type: frontal or flank
10. designated overwatch vehicle (if flank attack is specified)
11. attack continuation switch (specifies whether to continue the attack beyond the objective position)
12. attack continuation direction indicator for an attack continuation beyond the objective position
13. attack continuation distance

The behavior begins by setting the fire permission for the platoon to "Free". If a frontal attack is specified, a **Traveling** CIS will be executed to move the platoon directly toward the objective in the specified assault formation, with the specified vehicle spacing and speed.

If a flank attack is specified, an **Occupy a Temporary Defensive Position** CIS will be executed for the designated overwatch vehicle, using its current location as the desired defensive position and the azimuth to the objective as the direction to the enemy. A **Traveling** CIS will be executed for each of the remaining vehicles, with a route computed to create an arcing path from their current location to the objective. The path will arc to the left if the overwatch vehicle is situated to the right of the line from the platoon's centroid to the objective; otherwise, the path will arc to the right. The assault route will be constructed to achieve a 45 degree angle between the final approach to the objective and the line from the overwatch vehicle and the objective. The behavior will place the calculated assault path on the ModSAF Plan View

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Display (PVD), so that the operator can edit it if desired. The figure below illustrates the situation in which a left flank assault path is constructed.



In the case of a dismounted assault, the **Dismount Vehicle** CIS will be executed for each assaulting vehicle when the first vehicle crosses the selected dismount line. The dismounted infantry then move 50 meters ahead of the carrier vehicles, using the specified squad formation and spacing.

Upon the first vehicle crossing the objective position, a radio message is sent on the company net indicating that the objective has been taken. If conducting a dismounted assault, the **Remount Vehicle** CIS will then be executed for each assaulting vehicle. The behavior will then reset the fire permissions of all vehicles to their previous values and execute one of two possible tasks. A **Traveling** CIS will be executed if the attack continuation switch has been selected. The behavior will move the platoon a specified continuation distance in the specified direction, maintaining the assault formation and spacing, after which the behavior will terminate. An **Occupy a Temporary Defensive Position** CIS will be executed, using the objective position as the position to be occupied, if an attack continuation switch was not selected. Note that in either case, if a flank assault has been conducted, the executing CIS will require the overwatch vehicle to move forward to "catch up" with the assaulting vehicles and assume their specified formation and spacing.

8.3 Motorized Rifle Company

8.3.1 Attack from the March

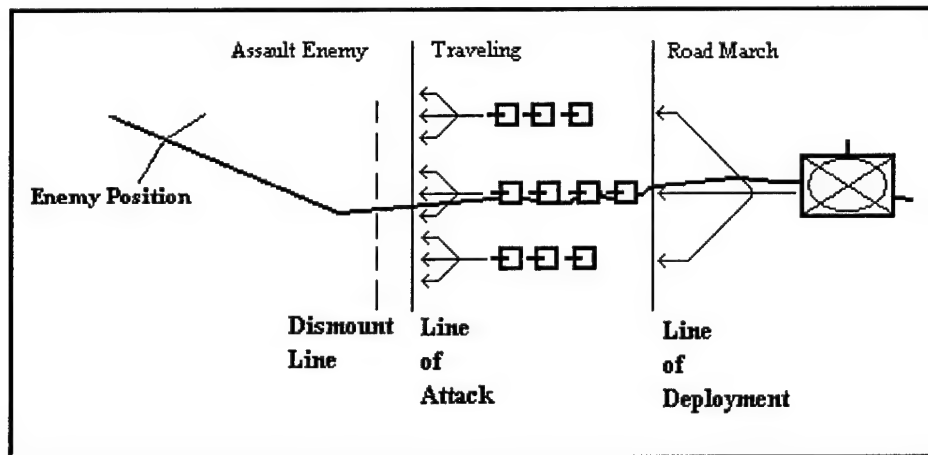
A new behavior model will be developed to address the **Attack from the March** CIS. The behavior will provide a task editor to accept the following inputs from the operator:

1. a march route consisting of a point, a line, or a series of connected line segments
2. a line of deployment
3. a line of attack
4. platoon attack formation
5. mounted/dismounted attack switch
6. squad assault formation
7. a dismount line when a dismounted attack is called for
8. an objective position
9. an attack continuation switch used to continue an attack beyond the objective position
10. an attack continuation direction indicator for an attack continuation beyond the objective position
1. an attack continuation distance

2. a desired march speed
3. platoon spacing during attack
4. vehicle spacing during attack
5. assault type (frontal or flank)
6. designated overwatch platoon (if flank assault is specified)

This behavior will be implemented as a series of tasks that execute sequentially upon platoons reaching specific landmarks. The behavior will begin by executing a **Tactical Road March** CIS with a specified route and speed. The behavior will monitor the progress of each unit along the route. Once the first vehicle crosses the line of deployment, the company will execute a **Traveling** CIS, with the company in line formation and each platoon in column formation. Vehicles will be spaced according to the specified vehicle and platoon settings during the attack.

Upon the first vehicle of each platoon reaching a point 100 meters from the line of attack, each platoon will implement its designated assault formation. Upon the first vehicle in the company crossing the line of attack, the behavior will execute an **Assault Enemy Position** CIS at a maximum possible speed. A radio message will be sent on the battalion net to report the crossing of the line of attack.



8.3.2 Assault an Enemy Position

A new behavior model will be developed to address the **Assault an Enemy Position** CIS. The behavior will provide a task editor to accept the following inputs from the operator:

1. objective position (point)
2. assault type (frontal or flank)
3. platoon formation for assault
4. platoon spacing
5. vehicle spacing
6. mounted/dismounted assault switch
7. squad assault formation
8. dismount line if dismounted assault is specified
9. an attack continuation switch used to continue an attack beyond the objective position
10. an attack continuation direction indicator for an attack continuation beyond the objective position
11. an attack continuation distance
12. a designated platoon for overwatch role if a flank attack is specified

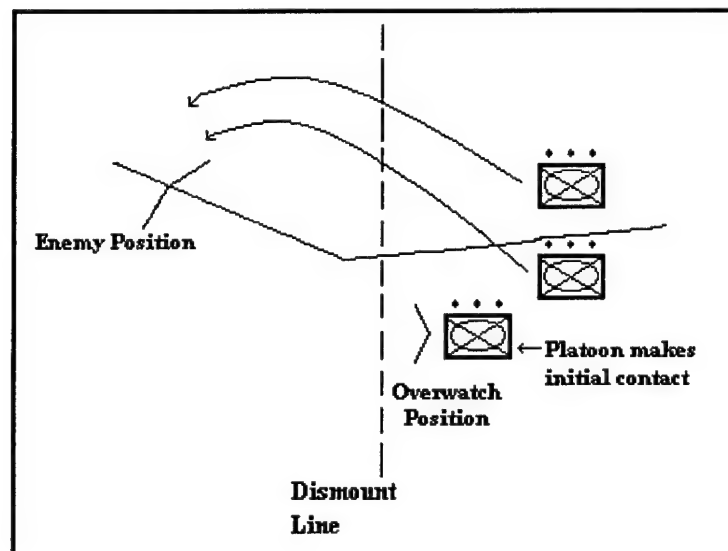
This behavior will be implemented based on type of assault specified:

1. Frontal Assault

During a frontal assault, the behavior will direct each platoon in the company to execute an **Assault an Enemy Position** CIS, passing the appropriate task inputs to the platoon behavior. Upon the first company vehicle crossing the objective position, a radio message will be generated on the battalion net, indicating that the objective has been taken.

2. Flank Assault

The designated platoon for overwatch takes up a defensive position by executing an **Occupy a Temporary Defensive Position** CIS at its current location, and its fire permission is set to "Free". The remaining platoons maneuver in an arc to approach the objective from the flank. The flank direction and maneuver path are computed by the same algorithm used in the platoon-level assault behavior, described in Section 8.2.4. The behavior will place the calculated maneuver path on the PVD, so that the operator can edit it if desired. The behavior will then set the fire permissions to "Free" and execute a **Traveling** CIS for each platoon (minus the overwatch platoon), with the specified formation and path. When the first vehicle crosses the dismount line, the **Dismount Vehicle** CIS will be executed for each assaulting platoon. Upon the first company vehicle crossing the objective position, a radio message will be generated on the battalion net, indicating that the objective has been taken, and the **Remount Vehicle** CIS will be executed for each assaulting platoon. The behavior will then reset the fire permission for the overwatch platoon to its previous value and execute a **Traveling** CIS to move it in its current formation to the objective position. The figure below illustrates the situation of a flank assault.



The behavior will then reset the fire permissions for the assaulting platoons to their previous values and execute one of two possible tasks. A **Traveling** CIS will be executed if the attack continuation switch has been selected. In this case the behavior will move the company a specified continuation distance in the specified direction. An **Occupy a Temporary Defensive Position** CIS will be executed if an attack continuation switch was not selected.

A radio message will be sent on the battalion net upon a serious loss of friendly forces (based on a percentage threshold value provided in an input file for the vehicle executing the unit's tasks).

8.3.3 Execute a Fire Engagement

A new behavior model will be developed to address the **Execute a Fire Engagement** CIS. The behavior will provide a task editor to accept the following inputs from the operator:

1. firing position (line)
2. target location (point)
3. company formation
4. platoon formation
5. desired movement speed

The behavior will execute the **Traveling** CIS, with the specified company and platoon formations and desired speed, to move the company to the vicinity of the specified firing position. It will then set the company's fire permission to "Free" and execute the **Occupy a Temporary Defensive Position** CIS to move the vehicles into covered/concealed firing positions, facing the specified target location.

A radio message will be sent on the battalion net to report a serious loss of friendly forces (based on a percentage threshold value provided in an input file for the vehicle executing the unit's tasks).

The acquired target list will be continually monitored. If the enemy force is perceived to have been destroyed or retreated, the following actions will be taken:

1. fire permissions will be reset to their previous values.
2. a radio message will be sent on the battalion net reporting friendly losses and indicating that the enemy force has been destroyed or has retreated. The criterion for deciding that the enemy force has been destroyed or has retreated is the same as that described in Section 8.1.6.
3. The behavior will be terminated.
 - a.

8.3.4 Occupy a Temporary Defensive Position

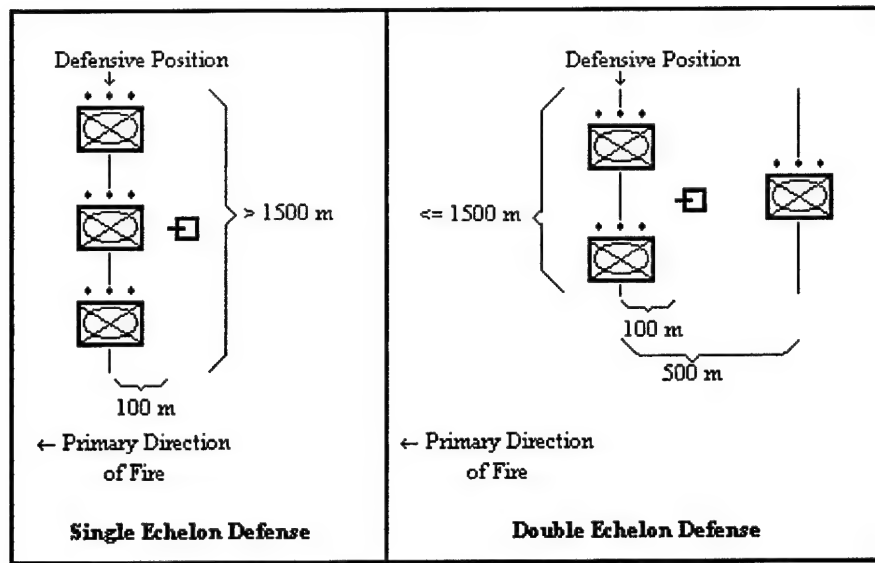
A new behavior model will be developed to address the **Occupy a Temporary Defensive Position** CIS. The behavior will provide a task editor to accept the following inputs from the operator:

1. defensive position (line or piecwise linear curve)
2. primary direction of fire

The common **Occupy Defensive Position** behavior (described in Section 8.1.3) will be invoked for each platoon and the company commander's vehicle to occupy their respective defensive positions. The defensive positions that are provided as input to the platoon's **Occupy Defensive Position** behaviors will be determined in the following fashion:

1. If the length of the specified defensive position for the company is greater than 1500 meters, the company will defend in one echelon. The platoon positions will be determined by evenly spacing them along the defensive position line and assigning each platoon a 400 m segment of the company's defensive position.
2. If the length of the specified defensive position line is less than or equal to 1500 meters, the company will defend in two echelons. Two of the platoons will be spaced evenly along the defensive position line, and the third platoon will be placed on a line parallel to and 500 meters behind the specified defensive position line. Each platoon will be assigned a defensive position 400 m wide.
3. The company commander's position will be centered 100 meters behind the defensive position line, regardless of the length of the defensive position.

The figure below illustrates the platoon formations for a single or double echelon defense.



The behavior will monitor the platoons, and will generate radio messages on the battalion net for the following events being received on the company net:

- a. enemy contact
- b. positions are occupied

8.3.5 Conduct a Meeting Engagement

A new behavior model will be developed to address the **Conduct a Meeting Engagement** CIS for the Motorized Rifle Company. It will be treated as a situational interrupt that is invoked when enemy contact occurs during the execution of **Conduct Tactical Road March**; hence, it will not provide a task editor to the operator and will not accept any inputs.

The behavior will begin by processing the company's list of acquired targets to determine the centroid of the enemy vehicles detected. It will then determine a position to be occupied by the platoon making initial contact (i.e., the platoon that has enemy vehicles on its contact list) by constructing a line 400 m long through that platoon's current location (centroid of the locations of its vehicles) and perpendicular to the line from its current location to the centroid of the enemy targets detected. (Note: If more than one platoon has made contact with the enemy, an arbitrary choice will be made among them.) It will then execute the **Occupy Defensive Position** behavior (described in Section 8.1.3), providing that line and the direction to the centroid of the detected enemy as inputs. The fire permission will be set to "Free" for the platoon making initial contact.

The remaining platoons will be directed to execute **Assault an Enemy Position**, specifying a mounted assault in a line formation with the centroid of detected enemy as the objective and the attack continuation switch turned off.

The progress of the assaulting platoons will be monitored. When the assault objective is attained by at least one of the platoons, a radio message will be sent on the battalion net indicating that the objective has been taken, and the behavior will be terminated.

The company's losses will be continually monitored during the assault. If losses exceed a percentage specified in the data file for the vehicle executing the behavior, the assault is stopped and the assaulting platoons execute the **Occupy Defensive Position** take up defensive positions at their current location.

The acquired target list will also be continually monitored. If the enemy force is perceived to have been destroyed or retreated, the behavior will be terminated and a radio message will be sent on the battalion net reporting friendly losses and indicating that the enemy force has been destroyed or has retreated. The criterion for deciding that the enemy force has been destroyed or has retreated is the same as that described in Section 8.1.6.

8.4 Tank Platoon

8.4.1 Assault an Enemy Position

A new behavior model will be developed to address the **Assault an Enemy Position** CIS. The behavior will provide a task editor to accept the following inputs from the operator:

1. objective position (point)
2. platoon attack formation
3. attack speed
4. vehicle spacing during the assault
5. an attack continuation switch used to continue an attack beyond the objective position
6. an attack continuation direction indicator for an attack continuation beyond the objective position
7. an attack continuation distance

The platoon will move in the specified formation toward the objective position by executing a **Traveling** CIS. The attack speed defaults to 10 km/h unless specified, and is dependent upon terrain constraints. The platoon's fire permissions will be set to "Free".

Tanks will orient their guns forward and focus observation in the following designated sectors:

- The left flank tank will be responsible for a sector from 8 o'clock to 12 o'clock
- The center tank will be responsible for the sector from 10 o'clock to 2 o'clock
- The right flank tank will be responsible for a sector from 12 o'clock to 4 o'clock

Spacing of vehicles will be as specified, or default to 100 meters between tanks. Upon the first vehicle of the platoon crossing the objective position, a radio message will be generated on the company net, and the behavior will perform one of two possible tasks. A **Traveling** CIS will be executed if the attack continuation switch has been selected. The behavior will move the platoon a specified continuation distance in the specified direction. An **Occupy a Temporary Defensive Position** CIS will be executed if the attack continuation switch was not selected.

Radio messages will be sent on the company net upon destruction or retreat of enemy force or a serious loss of friendly force (based on a percentage threshold value provided in an input file for the vehicle executing the behavior). The criterion for deciding that the enemy force has been destroyed or has retreated is the same as that described in Section 8.1.6.

8.5 Tank Company

8.5.1 Assault an Enemy Position

A new behavior model will be developed to address the **Assault an Enemy Position** CIS, which will be quite similar to the **Assault an Enemy Position** CIS for the Tank Platoon. It will provide a task editor that will accept the following inputs from the operator:

1. objective position (point)

2. platoon attack formation
3. attack speed
4. platoon spacing during the assault
5. vehicle spacing during the assault
6. an attack continuation switch used to continue an attack beyond the objective position
7. an attack continuation direction indicator for an attack continuation beyond the objective position
8. an attack continuation distance

The behavior will compute an objective position for each platoon, such that the platoon objectives are aligned perpendicular to the direction of assault and spaced at intervals equal to the designated platoon spacing. It will then execute an **Assault an Enemy Position** CIS for each platoon, with its calculated objective position .

Tanks in each platoon will orient their guns forward and focus observation in the following designated sectors:

- The left flank tank will be responsible for a sector from 8 o'clock to 12 o'clock
- The center tank will be responsible for the sector from 10 o'clock to 2 o'clock
- The right flank tank will be responsible for a sector from 12 o'clock to 4 o'clock

The behavior will monitor the platoon level tasks, and will generate a radio message on the battalion net for the following events:

- a. crossing of the objective position by the first platoon
- b. a serious loss of friendly force, based on a percentage threshold (threshold value provided in an input file for the vehicle executing the unit's tasks).

8.6 ATGM Squad

All CISs to be implemented for this unit are addressed by the common behaviors, described in Section 8.1.

8.7 ATGM Platoon

All CISs to be implemented for this unit are addressed by the common behaviors, described in Section 8.1.

8.8 SP Howitzer Battery

8.8.1 Occupy Firing Position

A new behavior model will be developed to address the **Occupy Firing Position** CIS for the SP Howitzer Battery. The behavior will provide a task editor to accept the following inputs from the operator:

1. firing position location (point)
2. movement route to vicinity of firing position (point, line, or connected line segments)
3. primary direction of fire (azimuth)
4. road march formation
5. vehicle spacing during road march
6. road march speed

The behavior will begin by executing the **Conduct Tactical Road March** CIS, using the specified movement route. After initiating the road march, the behavior will embark upon computations to determine the exact firing position to be occupied by each gun, as well as the positions to be occupied by

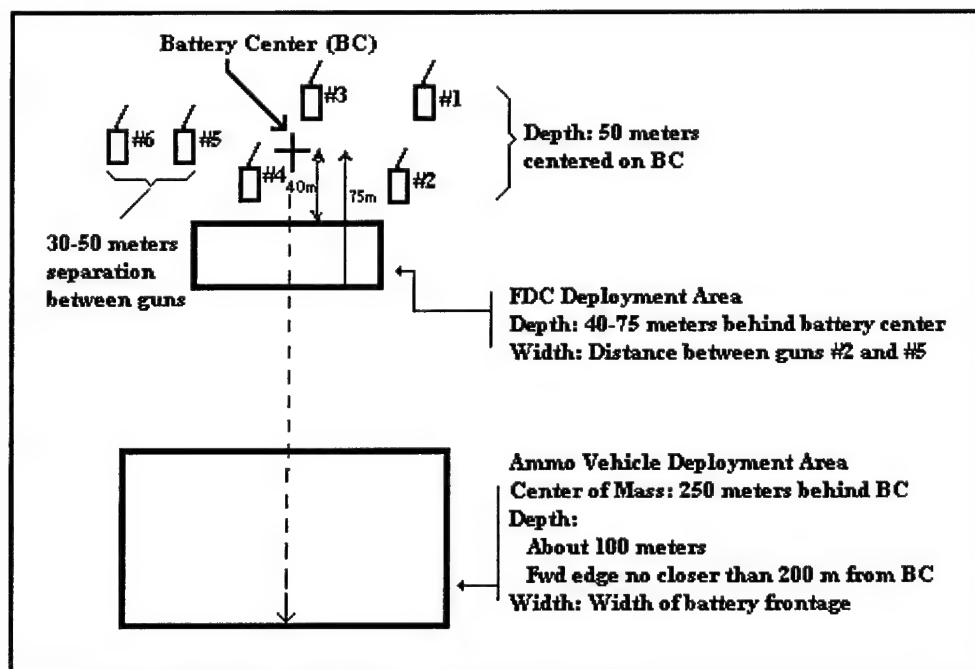
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the ammunition vehicles and fire direction center (FDC). These computations will invoke terrain reasoning algorithms which are computation-intensive, so they will be spread over several execution threads.

The firing positions for the guns will be determined sequentially, beginning with Gun #3. A rectangular search area on the ground will be defined for each gun, and a terrain reasoning algorithm will be employed to locate the best covered and concealed position within that area. The guns will attempt to align along a line, known as the line of metal, which passes through the specified firing position location for the battery and is perpendicular to the primary direction of fire. Each gun's search area will have a depth of 50 m, centered on the line of metal, and a width of 20 m (width and depth specified in the vehicle's data file). The center of the search area for Gun #3 will be on the line of metal, 20 m to the right of the firing position location specified for the battery. Within its calculated search area, the specific firing position for Gun #3 is determined by the terrain reasoning algorithm. The search area center for Gun #2 is then defined to be 40 m to the right of Gun #3. The terrain reasoning algorithm is then invoked to determine the exact firing position for Gun #2. This process continues for each gun with the search area center defined for each gun as follows: Gun #1 40 m right of Gun #2, Gun #4 40 m left of Gun #3, Gun #5 40 m left of Gun #4, and Gun #6 40 m left of Gun #5.

The FDC will also employ the terrain reasoning algorithm to locate a covered and concealed position. Its search area will extend in depth from 40 m behind the line of metal to 75 m behind the line of metal and in width from the firing position of Gun #2 to that of Gun #5. The Command Observation Post vehicle will then employ the terrain reasoning algorithm to locate a covered and concealed position 30 to 50 meters to the right of the FDC.

The ammunition vehicles will also employ the terrain reasoning algorithm to locate covered/concealed positions. Their search area will extend in depth from 200 m to 300 m behind the line of metal and in width from the firing position of Gun #1 to that of Gun #6, and no vehicle's position will be permitted to lie within 50 m of the position calculated for any other vehicle. The figure below illustrates all platoon positions during the behavior.



When the first vehicle in the battery reaches the end of the movement route, movement orders will be issued to each vehicle to move them to their calculated covered/concealed locations. When all vehicles have arrived at their designated locations, a time delay will be invoked for battery emplacement. The time delay will be sampled from a uniform distribution whose minimum and maximum values will be specified in vehicle's data file. When the emplacement time has elapsed, the battery's status will be set to "ready to fire" and the commander will send a radio message on the artillery net indicating that the battery is in position and ready to fire.

This behavior will not terminate until the operator assigns a new mission to the battery.

8.8.2 Conduct Unobserved Fire Mission

A new behavior model will be developed to address the **Conduct Unobserved Fire Mission** CIS for the SP Howitzer Battery. The behavior will provide a task editor that will accept the following inputs from the operator:

1. Mission type (Successive Fire Concentration, Standing Barrage, or Unplanned)
2. Target location and type
3. Target characteristics as a function of mission type:
 - Successive Fire Concentration: distance between 1st and 2nd line
 - Standing Barrage: target width
 - Unplanned: target width and depth
4. Target axis orientation
5. Engagement timing (Time on Target, Immediate, or At Command)
6. Time after 1st firing at which fire will be shifted to 2nd target line (Successive Fire Concentration mission type only)
7. Duration of firing at 2nd target line (Successive Fire Concentration mission type only)
8. Preferred munition type

After receiving the fire mission, a time delay will be imposed (parameterized as a function of the engagement timing specification), after which all howitzers fire their first round at the target. A radio message will be sent on the artillery net indicating that the battery has commenced firing.

The aimpoint for each howitzer will vary according to the mission type, as follows:

- * Successive Fire Concentration
Battery fires at 1st target line for a specified period of time, then shift to 2nd target line for specified duration. Aimpoints are equally spaced along the designated target line, with the spacing computed to cover the specified target width.
- * Standing Barrage
If the angle between the firing battery's deployment line and the target axis is less than 30 degrees, aim points are spaced 50 m apart along the target axis. Otherwise, two aimpoints are used, with one platoon aiming at each aimpoint, and with the aimpoints centered on the target axis, separated by half the battery's width.
- * Unplanned
Fire first volley along a line centered in the target depth, equally spaced to cover the specified target width. If target depth exceeds 200 m, the 2nd and 3rd volleys are aimed at the center of the target area plus 1/3 the depth of the target and minus 1/3 the depth of the target area, respectively. Successive volleys continue to alternate among the target center, center + 1/3 depth, and center - 1/3 depth. If target depth does not exceed 200 m, all volleys are aimed at the center of the target area.

Howitzers continue firing independently until the required number of rounds have been delivered (as determined by a table specified in the vehicle's parameter file, dimensioned by target type, munition type, and target size), or, in the case of the Successive Fire Concentration mission type, until the specified firing

duration has transpired. The time between firings is governed by the specified maximum firing rate for the howitzer type.

When the required number of rounds have been fired, a radio message will be sent on the artillery net indicating that the battery has completed the mission. The behavior will then terminate.

8.9 Air Defense Platoon (SA-16)

8.9.1 Engage an Aerial Target

No new behavior model will be required to address this CIS, since existing ModSAF models for target search, target selection, and target engagement can be utilized. The data file for the SA-16 system will be modified to reflect the following target priorities (from highest to lowest), as specified in the CIS:

1. FWA/RWA with anti-tank weapons
2. Other Ground attack aircraft
3. Electronic countermeasure (ECM) aircraft
4. All other aircraft

8.10 Air Defense Battery (2S6)

8.10.1 Occupy Firing Position

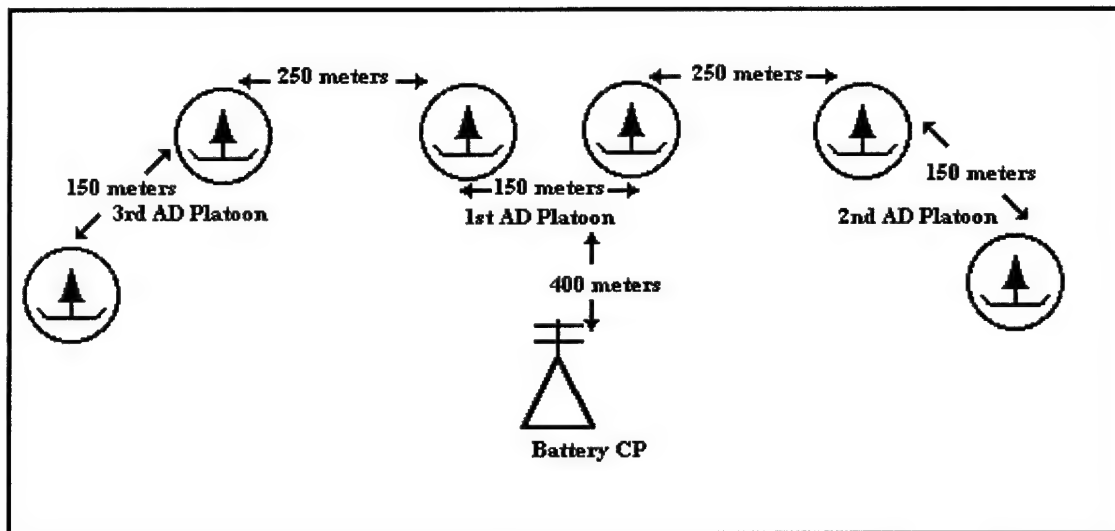
A new behavior model will be developed to address the **Occupy Firing Position** CIS for the 2S6 battery. The model will provide a task editor to the operator, which will accept the following inputs:

1. defensive position to be occupied (point)
2. direction of expected air attack

The behavior will begin by executing **Conduct A Tactical Road March** to move to within 1 kilometer of leading edge of firing position.

Positions for the platoons will be defined as three lines arranged with a center line perpendicular to the direction of expected air attack and a line on either side of it angled 45 degrees back (away from the direction of expected air attack). The center line will be centered at the specified defensive position for the battery. Each line will be 250 m long, and there will be a 150 m separation between lines. The common behavior **Occupy Defensive Position**, described in Section 8.1.6, will then be invoked for each platoon, with its designated line, to identify covered/concealed positions for each vehicle with good visibility in the direction of expected air attack and to move the vehicles to those positions. The fire position will be set to "Free" for all vehicles in the battery.

A position for the command vehicle will be defined 400 m to the rear of the specified position for the battery. The **Occupy Defensive Position** behavior will also be invoked to move the command vehicle to a covered/concealed location in the general vicinity of its designated position. The figure below illustrates the locations of the platoons during the behavior.



When all vehicles have arrived at their positions, a radio message will be sent on the battalion net indicating that the firing position has been occupied.

This behavior will not terminate until the operator assigns a new mission to the battery.

8.10.2 Engage an Aerial Target

No new behavior model will be required to address this CIS, since existing ModSAF models for target search, target selection, and target engagement can be utilized. The data file for the 2S6 system will be modified to reflect the following target priorities (from highest to lowest), as specified in the CIS:

1. FWA/RWA with anti-tank weapons
2. Other Ground attack aircraft
3. Electronic countermeasure (ECM) aircraft
4. All other aircraft

8.10.3 Employ Target Acquisition Radar

The actions called for in this CIS are generally addressed in ModSAF by the existing radar model. However, the CIS specifies that the battery commander may specify a 360 degree search sector for each platoon or may partition the airspace into sectors per platoon. This feature will be addressed by the development of a simple behavior model that will execute continuously in the background for the 2S6 battery. The behavior will provide a task editor that allows the operator to select "360 degree" mode or "partitioned" mode for the platoon's search sectors. If "partitioned" mode is selected, the operator will be allowed to specify the search sector for each platoon individually. The search sector specification may be modified at any time by the operator and will immediately be communicated to the radar model to modify the scan sector for each platform in the battery.

8.10.4 Provide Air Defense Coverage

No new behavior is required to address this CIS, since the actions called for are accounted for in the behavior model for the **Occupy Firing Position** CIS and the background tasks that perform target acquisition, target selection, and target engagement. The **Provide Air Defense Coverage** mission will be

provided to the operator as a selectable mission. Selecting this mission will result in the setup and execution of the **Occupy Firing Position** behavior.

9. Algorithm Methodology

Existing ModSAF algorithms will be used for physical model simulation, whereas new algorithms will be developed for threat tactical behaviors.

10. Data Availability

N/A

11. Other

N/A

12. Issues

N/A

ADVANCED DISTRIBUTED SIMULATION TECHNOLOGY II (ADST II)

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FINAL REPORT APPENDIX B

SOFTWARE REQUIREMENTS SPECIFICATION



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12350 Research Parkway
Orlando, FL 32826-3224
N61339-96-D-0002
DI-MISC-80711

BY: Lockheed Martin
ADST-II Team
P.O. Box 780217
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1. Conceptual Model

This SRS can be traced to the following conceptual model:

Document Control No.: ADST-II-MISC-MODSAF-9700341

- Document Title: "ModSAF Threat Enhancement Final Report - Appendix A: Conceptual Model"

2. Referenced Documents

- CATT RTASK Database, Resource Consultants Inc., Software Version dated 3 Apr. 97
- Threat Data Requirements Specification, ADST-II ModSAF Threat Enhancement Delivery Order, 18 Jul. 97, ADST-II-MISC-MODSAF-9700313
- Software Development Plan for the ModSAF Program, Revision B, 19 Feb. 97, ADST-II-CDRL-011R-9600167-C
- Refer to the "Referenced Documents" section of the "ModSAF Threat Enhancement Conceptual Model" for additional related references.

3. Requirements

Each requirement described in this section consists of a unique identifier, the requirement text and a qualification method. The unique identifier consists of the relevant ModSAF CSA system requirement number, followed by a dash (-) and a unique three digit number. The requirement text is a single sentence that specifically states what is to be performed by the software. The qualification method is either: demonstration (D), test (T), analysis (A), inspection (I) or special (S.) A description for each qualification method follows:

- Demonstration: The operation of the capability, or a part of the capability, that relies on observable functional operation not requiring the use of instrumentation, special test equipment, or subsequent analysis.
- Test: The operation of the capability, or a part of the capability, using instrumentation or other special test equipment to collect data for later analysis.
- Analysis: The processing of accumulated data obtained from other qualification methods. Examples are reduction, interpretation, or extrapolation of test results.
- Inspection: The visual examination of capability code, documentation, etc.
- Special qualification methods: Any special qualification methods for the capability, such as special tools, techniques, procedures, facilities, and acceptance limits.

3.1 Capability Requirements

The ModSAF Threat Enhancement system consists of the following capabilities and constituent capabilities. An overview along with corresponding requirements is provided in the following sections for each capability and constituent capability.

The Common Threat Behaviors capability, presented in Section 3.1.1, addresses the aspects which are common to more than one threat unit's behaviors. This approach reduces the duplication of like requirements across multiple capabilities. Requirements in the Common Threat Behaviors capability are referenced by other capabilities which have the common characteristic.

The capabilities presented in each of Sections 3.1.2 through 3.1.10 correspond to a distinct threat unit and address its aggregate unit composition and behavioral characteristics. Section 3.1.11 gives requirements for a classified threat system database.

3.1.1 Common Threat Behaviors Capability

The Common Threat Behaviors Capability represents the behavioral characteristics that are common to two or more CIs.

Requirement Number	Common Threat Behaviors Capability Requirements	Qualification Method
Ground Contact Reaction		
222-0001	The Common Threat Behaviors capability, for Ground Contact Reaction, shall model the reaction to ground contact, based on the following parameters: a. reaction enabling switch b. threat threshold for triggering a reaction c. assault type (for the "attack" reaction)	I
222-0002	The Common Threat Behaviors capability, for Ground Contact Reaction, shall permit GUI designation of a reaction enabling switch with the following options: a. disable reaction b. enable reaction Note: The default is "enable reaction."	D
222-0003	The Common Threat Behaviors capability, for Ground Contact Reaction, shall permit GUI designation of the threat threshold for triggering a reaction to ground contact, as a value from one to ten. Note: The default is one.	D
222-0004	The Common Threat Behaviors capability, for Ground Contact Reaction, shall permit GUI designation of the assault type for the "attack" reaction as one of the following: a. flank b. frontal Note: The default is "flank."	D
222-0005	The Common Threat Behaviors capability, for Ground Contact Reaction, shall provide parametric data values for the following: a. reaction initiation delay (default of 30 seconds) b. reaction termination delay (default of 30 seconds) c. serious loss percentage (default of 50%)	I
222-0006	The Common Threat Behaviors capability, for Ground Contact Reaction, shall evaluate the perceived enemy force size and type based on the unit's list of acquired targets whose level of target resolution exceeds "classification," when the reaction is enabled from the GUI and after exceeding a "threat threshold" of ground contact for a parameterized "reaction initiation delay."	I
222-0007	The Common Threat Behaviors capability, for Ground Contact Reaction, shall trigger one of the following reactions, based on a	D

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	<p>comparison of the perceived enemy force size and type with the unit's own unit size, type, and current mission, when the reaction is enabled from the GUI and after exceeding a "threat threshold" of ground contact for a parameterized "reaction initiation delay":</p> <ul style="list-style-type: none"> a. defend b. attack c. engage by fire d. meeting engagement 	
222-0008	The Common Threat Behaviors capability, for Ground Contact Reaction, shall interrupt the unit's current mission, set fire permission to "free," and execute Occupy Defensive Position (specifying the unit's current location as the desired defensive position), when the "defend" reaction is triggered.	D
222-0009	The Common Threat Behaviors capability, for Ground Contact Reaction, shall interrupt the unit's current mission, set fire permission to "free," and execute Assault an Enemy Position (with the designated assault type and with the centroid of detected enemy platforms as the objective), when the "attack" reaction is triggered.	D
222-0010	The Common Threat Behaviors capability, for Ground Contact Reaction, shall set fire permission to "free" and shift search sectors toward the centroid of the detected enemy force, when the "engage by fire" reaction is triggered.	D
222-0011	The Common Threat Behaviors capability, for Ground Contact Reaction, shall execute Conduct a Meeting Engagement, when the "meeting engagement" reaction is triggered.	D
222-0012	The Common Threat Behaviors capability, for Ground Contact Reaction, shall end execution of any ongoing ground contact reaction, reset fire permissions to their previous values, and resume the unit's interrupted mission when the current perceived threat force size is less than the "threat threshold" of ground contact for a parameterized "reaction termination delay."	D
222-0013	The Common Threat Behaviors capability, for Ground Contact Reaction, shall send a "enemy destroyed or repelled" report (including the number of enemy platforms destroyed) on the company net when the unit is a platoon and a ground contact reaction has been terminated.	D
222-0014	The Common Threat Behaviors capability, for Ground Contact Reaction, shall send a "enemy destroyed or repelled" report (including the number of enemy platforms destroyed) on the battalion net when the unit is a company and a ground contact reaction has been terminated.	D
222-0015	The Common Threat Behaviors capability, for Ground Contact Reaction, shall send a "serious friendly loss" report (including the number of friendly losses suffered) on the company net when the unit is a platoon and a ground contact reaction has been terminated and the parameterized "serious loss percentage" has been exceeded.	D
222-0016	The Common Threat Behaviors capability, for Ground Contact Reaction, shall send a "serious friendly loss" report (including the number of friendly losses suffered) on the battalion net when the unit is a company and a ground contact reaction has been terminated and the parameterized "serious loss percentage" has been exceeded.	D
Indirect Fire Reaction		

222-0101	The Common Threat Behaviors capability, for Indirect Fire Reaction, shall model the reaction to indirect fire, based on the following parameters: a. reaction enabling switch b. radius of indirect fire concern	I
222-0102	The Common Threat Behaviors capability, for Indirect Fire Reaction, shall permit GUI designation of a reaction enabling switch with the following options: a. disable reaction b. enable reaction Note: The default is "enable reaction."	D
222-0103	The Common Threat Behaviors capability, for Indirect Fire Reaction, shall permit GUI designation of the radius of indirect fire concern. Note: The default is one kilometer.	D
222-0104	The Common Threat Behaviors capability, for Indirect Fire Reaction, shall provide parametric data values for the following: a. reaction termination delay (default of 3 minutes) b. vehicle spacing percentage increase (default of 50%) c. vehicle speed percentage increase (default of 50%)	D
222-0105	The Common Threat Behaviors capability, for Indirect Fire Reaction, shall trigger a reaction to indirect fire when the reaction is enabled from the GUI and indirect fire is received within the designated radius of concern.	D
222-0106	The Common Threat Behaviors capability, for Indirect Fire Reaction, shall increase the speed of all vehicles in the unit by a parameterized percentage when a reaction to indirect fire is triggered and the unit is moving.	D
222-0107	The Common Threat Behaviors capability, for Indirect Fire Reaction, shall increase the spacing between vehicles in the unit by a parameterized percentage when a reaction to indirect fire is triggered and the unit is moving.	D
222-0108	The Common Threat Behaviors capability, for Indirect Fire Reaction, shall terminate any ongoing reaction to indirect fire when either of the following criteria is satisfied: a. no indirect fire is received within the designated radius of concern for a parameterized "reaction termination delay" b. no indirect fire is received within half the designated radius of concern for a parameterized "reaction termination delay," and the most recent indirect fire munition impacting within the designated radius was farther away than the previous one	D
222-0109	The Common Threat Behaviors capability, for Indirect Fire Reaction, shall reset the speed of all vehicles in the unit to their former values when a reaction to indirect fire has been terminated.	D
222-0110	The Common Threat Behaviors capability, for Indirect Fire Reaction, shall reset the spacing between vehicles in the unit to their former values when a reaction to indirect fire has been terminated.	D
Air Contact Reaction		
222-0201	The Common Threat Behaviors capability, for Air Contact Reaction, shall model the reaction to air contact, based on the following	I

	parameters: a. reaction enabling switch	
222-0202	The Common Threat Behaviors capability, for Air Contact Reaction, shall permit GUI designation of a reaction enabling switch with the following options: a. disable reaction b. enable reaction Design Guidance: The default is "enable reaction."	D
222-0203	The Common Threat Behaviors capability, for Air Contact Reaction, shall provide parametric data values for the following: a. maximum range to aircraft (default of 2 km) b. maximum altitude of aircraft (default of 4000 ft) c. vehicle spacing percentage increase (default of 50%) d. vehicle speed percentage increase (default of 50%) e. minimum range for "cover fire" (default of 500 m) f. lead distance per 20 m/s of aircraft crossing velocity (default of 20 m) g. long burst size (default of 12 rounds) h. short burst size (default of 6 rounds) i. reaction termination delay (default of 15 seconds)	I
222-0204	The Common Threat Behaviors, for Air Contact Reaction, shall trigger a reaction to air contact when an enemy aircraft is spotted by the unit and its range and altitude are less than the parameterized maximum values.	D
222-0205	The Common Threat Behaviors capability, for Air Contact Reaction, shall increase the speed of all vehicles in the unit by a parameterized percentage when a reaction to air contact is triggered and the unit is moving.	D
222-0206	The Common Threat Behaviors capability, for Air Contact Reaction, shall increase the spacing between vehicles in the unit by a parameterized percentage when a reaction to air contact is triggered and the unit is moving.	D
222-0207	The Common Threat Behaviors capability, for Air Contact Reaction, shall set fire permission to "free" and perform the "path fire method" of engagement when an air contact reaction is triggered and the enemy aircraft's range is less than the minimum range for "cover fire."	D
222-0208	The Common Threat Behaviors capability, for Air Contact Reaction, shall set fire permission to "free" and perform the "cover fire" method of engagement when an air contact reaction is triggered and the enemy aircraft's range is beyond the minimum "cover fire" range.	D
222-0209	The Common Threat Behaviors capability, for Air Contact Reaction, shall continuously fire at a location which leads the enemy aircraft by a parameterized distance per 20 m/s of aircraft crossing velocity (aircraft crossing velocity rounded to nearest multiple of 20 m/s) when performing the "path fire method" of engagement.	D
222-0210	The Common Threat Behaviors capability, for Air Contact Reaction, shall fire a parameterized "long burst" number of rounds when engaging the target using the "path fire" method.	D
222-0211	The Common Threat Behaviors capability, for Air Contact Reaction, shall perform conventional weapon aiming when engaging the target	D

	using the "cover fire" method (target lead determination and associated aiming errors are implicitly represented in the weapon's delivery accuracy data.)	
222-0212	The Common Threat Behaviors capability, for Air Contact Reaction, shall fire a parameterized "short burst" number of rounds when engaging the target using the "cover fire" method.	D
222-0213	The Common Threat Behaviors capability, for Air Contact Reaction, shall terminate any ongoing air contact reaction and reset the fire permissions to their previous values when the unit has no air contact within the parameterized maximum range and altitude for a parameterized "reaction termination delay."	D
222-0214	The Common Threat Behaviors capability, for Air Contact Reaction, shall provide the following information in an "engagement outcome" report when the unit terminates an air contact reaction: a. number of enemy aircraft destroyed b. number of friendly losses	D
222-0215	The Common Threat Behaviors capability, for Air Contact Reaction, shall send a "engagement outcome" report on the battalion net when the unit is a company	D
222-0216	The Common Threat Behaviors capability, for Air Contact Reaction, shall send a "engagement outcome" report on the company net when the unit is a platoon	D
Movement		
222-0301	The Common Threat Behaviors capability, for unit movement, shall enhance the existing ModSAF movement capability to permit GUI designation of the scan direction offset. Note: The default scan direction offset is zero (i.e. scan sectors referenced to unit's direction of movement)	D
222-0302	The Common Threat Behaviors capability, for unit movement, shall enhance the existing ModSAF movement capability to orient all main gun weapons of a unit based upon the designated scan direction offset.	D
222-0303	The Common Threat Behaviors capability, for unit movement, shall execute the existing ModSAF movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D
Formation		
222-0401	The Common Threat Behaviors capability, for unit movement, shall enhance the existing ModSAF formation capability to include the following formations: a. roadmarch column Note: The Motorized Rifle Company capability's Conduct Tactical Road March uses the "roadmarch column" formation.	D
222-0402	The Common Threat Behaviors capability, for unit movement, shall utilize a "roadmarch column" formation ordering as follows: a. 2 nd platoon's 2 nd vehicle b. 2 nd platoon's 1 st vehicle c. 2 nd platoon's 3 rd vehicle d. company headquarters vehicle	D

	<ul style="list-style-type: none"> e. 1st platoon's 2nd vehicle f. 1st platoon's 1st vehicle g. 1st platoon's 3rd vehicle h. 3rd platoon's 2nd vehicle i. 3rd platoon's 1st vehicle j. 3rd platoon's 3rd vehicle 	
222-0403	<p>The Common Threat Behaviors capability, for unit movement, shall utilize vehicle search sectors for the "roadmarch column" formation as follows:</p> <ul style="list-style-type: none"> a. 1st vehicle, 180 degrees centered forward b. last vehicle, 180 degrees centered rearward c. remaining even vehicle, 90 degrees centered 45 degrees left of forward d. remaining odd vehicle, 90 degrees centered 45 degrees right of forward 	D
222-0404	<p>The Common Threat Behaviors capability, for unit movement, shall utilize a vehicle spacing for the "roadmarch column" formation based upon the GUI designated vehicle spacing between the following vehicles:</p> <ul style="list-style-type: none"> a. 2nd platoon's 1st vehicle and 2nd platoon's 3rd vehicle b. company headquarters vehicle and 1st platoon's 2nd vehicle c. 1st platoon's 2nd vehicle and 1st platoon's 1st vehicle d. 1st platoon's 1st vehicle and 1st platoon's 3rd vehicle e. 1st platoon's 3rd vehicle and 3rd platoon's 2nd vehicle f. 3rd platoon's 2nd vehicle and 3rd platoon's 1st vehicle 	D
222-0405	<p>The Common Threat Behaviors capability, for unit movement, shall utilize a vehicle spacing for the "roadmarch column" formation of 10 times the GUI designated vehicle spacing between the following vehicles:</p> <ul style="list-style-type: none"> a. 2nd platoon's 2nd vehicle and 2nd platoon's 1st vehicle b. 3rd platoon's 1st vehicle and 3rd platoon's 3rd vehicle 	D
222-0406	<p>The Common Threat Behaviors capability, for unit movement, shall utilize a vehicle spacing for the "roadmarch column" formation of 80 times the GUI designated vehicle spacing between the following vehicles:</p> <ul style="list-style-type: none"> a. 2nd platoon's 3rd vehicle and company headquarters vehicle 	D
Assault (Platoon-level)		
222-0501	<p>The Common Threat Behaviors capability, for Assault, shall model an assault on a known or suspected enemy position, based upon the following parameters:</p> <ul style="list-style-type: none"> a. objective position b. platoon formation c. squad formation d. assault speed e. vehicle spacing f. squad element spacing g. assault continuation switch h. direction of continued assault i. distance of continued assault j. dismounted assault switch k. dismount line l. assault type 	I

	m. overwatch vehicle	
222-0502	<p>The Common Threat Behaviors capability, for Assault, shall permit GUI designation of the objective position as a point on the PVD.</p> <p>Note: This shall be a required input on the GUI (no default.)</p>	D
222-0503	<p>The Common Threat Behaviors capability, for Assault, shall permit GUI designation of the platoon formation as one of the following:</p> <ul style="list-style-type: none"> a. wedge b. vee c. line d. echelon-left e. echelon-right <p>Note: The default is "line."</p>	D
222-0504	<p>The Common Threat Behaviors capability, for Assault, shall permit GUI designation of the squad formation as one of the following:</p> <ul style="list-style-type: none"> a. wedge b. vee c. line d. echelon-left e. echelon-right <p>Note: The default is "line."</p>	D
222-0505	<p>The Common Threat Behaviors capability, for Assault, shall permit GUI designation of the assault speed.</p> <p>Note: The default is 10 km/hr.</p>	D
222-0506	<p>The Common Threat Behaviors capability, for Assault, shall permit GUI designation of the vehicle spacing used during the assault.</p> <p>Note: The default is 75 meters.</p>	D
222-0507	<p>The Common Threat Behaviors capability, for Assault, shall permit GUI designation of the squad spacing used during the assault.</p> <p>Note: The default is 7 meters.</p>	D
222-0508	<p>The Common Threat Behaviors capability, for Assault, shall permit GUI designation of an assault continuation switch.</p> <p>Note: This indicates whether the assault will continue beyond the objective.</p> <p>Note: The default is "no assault continuation."</p>	D
222-0509	<p>The Common Threat Behaviors capability, for Assault, shall permit GUI designation of the direction and distance of continued assault (by selecting a point on the PVD) when the assault continuation switch has been designated from the GUI.</p> <p>Note: No default will be provided for the attack continuation direction and distance. If the attack continuation switch is on and no point has been selected on the PVD to indicate the attack continuation distance and direction, no attack continuation will occur.</p>	D

222-0510	The Common Threat Behaviors capability, for Assault, shall permit GUI designation of a dismounted assault switch. Note: The default is "no dismounted assault."	D
222-0511	The Common Threat Behaviors capability, for Assault, shall permit GUI designation of the dismount line on the PVD when dismounted assault has been specified. Note: If a "dismounted assault" was selected, the dismount line shall be a required input on the GUI (no default.)	D
222-0512	The Common Threat Behaviors capability, for Assault, shall permit GUI designation of one of the following assault types: a. frontal b. flank Note: The default is "frontal."	D
222-0513	The Common Threat Behaviors capability, for Assault, shall permit GUI designation of the overwatch vehicle, when an assault type of "flank" has been specified. Note: No default will be provided for this input. If no overwatch vehicle is selected, the assault type will revert to "frontal."	D
222-0514	The Common Threat Behaviors capability, for Assault, shall provide parametric data values for the following: a. friendly loss threshold (default of 50%) b. DI lead distance (default of 50 meters) c. flank angle (default of 45 degrees) d. platoon defensive position width (default of 400 meters)	I
222-0515	The Common Threat Behaviors capability, for Assault, shall set the fire permissions of the unit to "free."	D
222-0516	The Common Threat Behaviors capability, for Assault, shall execute the Common Threat Behaviors Movement capability for the platoon, passing the following parameters, when the specified assault type is "frontal": a. route = line from unit's current location to objective b. travel type = "User Specified" c. formation = designated platoon formation d. sub-formation = designated squad formation e. speed = designated assault speed f. catch-up speed = 0.0 g. spacing = designated vehicle spacing h. sub-spacing = designated squad spacing i. scan direction offset = azimuth toward the objective	D
222-0517	The Common Threat Behaviors capability, for Assault, shall execute the Occupy Temporary Defensive Position behavior for the designated overwatch vehicle, passing the following parameters, when the specified assault type is "flank": a. defensive position = current location of overwatch vehicle b. direction of enemy = azimuth from defensive position to assault objective	D
222-0518	The Common Threat Behaviors capability, for Assault, shall compute parallel arcing paths to the vicinity of the objective position from the	D

	<p>current locations of each of the non-overwatch vehicles, based on the parameterized flank angle.</p> <p>Design note: See the Conceptual Model for the specification of the criterion for determining whether the arcing paths should arc to the left or the right.</p>	
222-0519	<p>The Common Threat Behaviors capability, for Assault, shall execute the Common Threat Behaviors Movement capability for the non-overwatch vehicles, passing the following parameters, when the specified assault type is "flank":</p> <ul style="list-style-type: none"> a. route = computed arcing path to objective b. travel type = "cross country" c. formation = "line" d. sub-formation = designated squad formation e. speed = designated assault speed f. catch-up speed = 0.0 g. spacing = 0.0 h. sub-spacing = designated squad spacing i. scan direction offset = azimuth toward the objective 	D
222-0520	<p>The Common Threat Behaviors capability, for Assault, shall execute the Dismount Vehicle behavior for each assaulting vehicle when the first vehicle crosses the dismount line and the dismounted attack switch is on.</p>	D
222-0521	<p>The Common Threat Behaviors capability, for Assault, shall update the Common Threat Behaviors Movement capability, passing the following parameters, when the dismounted attack switch has been selected and the unit has crossed the dismount line and the dismount has completed:</p> <ul style="list-style-type: none"> a. IFV x offset = 0.0 b. IFV y offset = -(parameterized DI lead distance) 	D
222-0522	<p>The Common Threat Behaviors capability, for Assault, shall reset the fire permissions of the unit to their previous values when the unit reaches the objective and the continued assault switch is off.</p>	D
222-0523	<p>The Common Threat Behaviors capability, for Assault, shall execute the Common Threat Behaviors Remount capability for each of the unit's dismounted squads when the platoon reaches the objective and the dismounted attack switch has been selected.</p>	D
222-0524	<p>The Common Threat Behaviors capability, for Assault, shall execute the Common Threat Behaviors Defensive Position capability, passing the following parameters, when the unit reaches the objective and the continued assault switch is off:</p> <ul style="list-style-type: none"> a. defensive position = line of parameterized "platoon defensive position width" length centered at assault objective b. enemy direction = same as azimuth used to assault the objective 	D
222-0525	<p>The Common Threat Behaviors capability, for Assault, shall calculate a route from the center of the objective in the direction of continued attack for a parameterized continued assault distance when the unit reaches the objective and the continued assault switch has been selected from the GUI.</p>	I
222-0526	<p>The Common Threat Behaviors capability, for Assault, shall execute the Common Threat Behaviors Movement capability, passing the following parameters, when the unit reaches the objective and the</p>	D

	<p>continued assault switch is on:</p> <ul style="list-style-type: none"> a. route = line from unit's current location in direction of continued assault, extending for assault continuation distance b. travel type = "cross country" c. formation = designated platoon formation d. speed = designated assault speed e. catch-up speed = 0.0 f. spacing = designated vehicle spacing g. scan direction offset = direction of continued assault 	
222-0527	The Common Threat Behaviors capability, for Assault, shall reset the fire permissions of the unit to their previous values when the unit has traveled the specified attack continuation distance past the objective and the continued assault switch is on.	D
222-0528	The Common Threat Behaviors capability, for Assault, shall end execution of the Common Threat Behaviors Assault when the unit reaches the objective and the continued assault switch is off.	D
222-0529	<p>The Common Threat Behaviors capability, for Assault, shall send a "seizure of the objective" report on the company radio network when the objective has been reached by the first vehicle in the platoon.</p> <p>Note: This report shall include the number of enemy platforms destroyed and the number of friendly losses.</p>	D
222-0530	The Common Threat Behaviors capability, for Assault, shall send a "serious friendly loss" report on the company radio network when the platoon's parameterized friendly loss threshold has been exceeded.	D
Occupy Defensive Position (Platoon or Squad level)		
222-0601	<p>The Common Threat Behaviors capability, for Occupy Defensive Position, shall enhance the existing ModSAF Occupy Defensive Position capability to accept the following additional parameters:</p> <ul style="list-style-type: none"> a. dismount switch b. number of firings allowed at one firing position 	I
222-0602	<p>The Common Threat Behaviors capability, for Occupy Defensive Position, shall permit GUI designation of a dismount switch with the following options:</p> <ul style="list-style-type: none"> a. perform dismount b. no dismount <p>Note: The default is "no dismount."</p>	D
222-0603	<p>The Common Threat Behaviors capability, for Occupy Defensive Position, shall permit GUI designation of the number of firings allowed at one firing position.</p> <p>Note: The default is zero (which indicates that no firing limit will be imposed.)</p>	D
222-0604	The Common Threat Behaviors capability, for Occupy Defensive Position, shall execute the Dismount Vehicle capability for each vehicle in the platoon as soon as it arrives at its primary firing position, if the dismount switch is set to "perform dismount."	D
222-0605	The Common Threat Behaviors capability, for Occupy Defensive Position, shall move a vehicle from its primary cover and concealment position to its alternate cover and concealment position, when the	D

	specified number of firings allowed at one position have occurred by the vehicle, if the number of firings allowed at one position is set to a non-zero value.	
222-0606	The Common Threat Behaviors capability, for Occupy Defensive Position, shall move a unit's vehicle from its alternate cover and concealment position to its primary cover and concealment position, when the specified number of firings allowed at one position have occurred by the vehicle, if the number of firings allowed at one position is set to a non-zero value.	D
222-0607	The Common Threat Behaviors capability, for Occupy Defensive Position, shall send a "in position" report on the company radio network when the unit is a platoon and all vehicles have reached their primary firing positions.	D
222-0608	The Common Threat Behaviors capability, for Occupy Defensive Position, shall send a "in position" report on the platoon radio network when the unit is a squad and all squad members have reached their primary firing positions.	D

3.1.2 Motorized Rifle Platoon Capability

The Motorized Rifle Platoon Capability represents the physical modeling of a Motorized Rifle Platoon unit and its behavioral characteristics pertaining to the following CISS:

- HVY-0312 Dismount Vehicle
- HVY-0316 Remount Vehicle
- HVY-0321 Conduct Tactical Road March
- HVY-0324 Conduct Fire Engagement
- HVY-0326 Assault An Enemy Position
- HVY-0327 Occupy a Temporary Defensive Position
- HVY-0328 Traveling

Requirement Number	Motorized Rifle Platoon Capability Requirements	Qualification Method
Unit Creation		
222-1001	The Motorized Rifle Platoon capability shall permit GUI creation of a Motorized Rifle Platoon comprising the following quantities and unit types: 3 - BMP-1s 3 - Motorized Rifle Squads	D
222-1002	The Motorized Rifle Platoon capability shall permit GUI creation of a Motorized Rifle Platoon comprising the following quantities and unit types: 3 - BMP-2s 3 - Motorized Rifle Squads	D
222-1003	The Motorized Rifle Platoon capability shall permit GUI creation of a Motorized Rifle Platoon comprising the following quantities and unit types: 3 - BTR-80s 3 - Motorized Rifle Squads	D
222-1004	The Motorized Rifle Platoon capability shall represent a Motorized Rifle Squad comprising the following quantities and weapon types:	D

	1 - RPK-74 (machine gun) 1 - RPG-22 (grenade launcher) 4 - AKM Avtomat Kalashnikov (assault rifle)	
HVY-0312 Dismount Vehicle		
222-1101	The Motorized Rifle Platoon capability, for the Dismount Vehicle order, shall enhance the existing ModSAF dismount capability to delay the dismount time of DI from a vehicle, using a parameterized DI dismount time delay Note: The default DI dismount time delay is one minute.	D
HVY-0316 Remount Vehicle		
222-1102	The Motorized Rifle Platoon capability, for the Remount Vehicle order, shall execute the existing ModSAF mount capability to delay the mount time of DI into a vehicle, using a parameterized DI remount time delay. Note: The default DI remount time delay is two minutes.	D
HVY-0321 Conduct Tactical Road March		
222-1103	The Motorized Rifle Platoon capability, for the Conduct Tactical Road March order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI. Note: The default for the Travel Type parameter is "roadmarch," and the default for the Formation parameter is "roadmarch column." All other parameters will be displayed with the same defaults as used by the Common Threat Behavior Movement capability.	D
222-1104	The Motorized Rifle Platoon capability, for the Conduct Tactical Road March order, shall send a "start of tactical road march" report on the company radio network when the order execution begins.	D
222-1105	The Motorized Rifle Platoon capability, for the Conduct Tactical Road March order, shall send a "completion of tactical road march" report on the company radio network when the order execution completes.	D
HVY-0324 Conduct Fire Engagement		
222-1201	The Motorized Rifle Platoon capability, for the Conduct Fire Engagement order, shall model the execution of a fire engagement, based on the following parameters: a. platoon formation b. firing position (line or piecewise linear curve) c. target location (point) d. movement speed	D
222-1202	The Motorized Rifle Platoon capability, for the Conduct Fire Engagement order, shall permit GUI designation of a platoon formation. Note: The default is "line."	D
222-1203	The Motorized Rifle Platoon capability, for the Conduct Fire Engagement order, shall permit GUI designation of a firing position as a line (or piecewise linear curve) on the PVD.	D

	Note: This shall be a required input on the GUI (no default.)	
222-1204	The Motorized Rifle Platoon capability, for the Conduct Fire Engagement order, shall permit GUI designation of a target location as a point on the PVD. Note: This shall be a required input on the GUI (no default.)	D
222-1205	The Motorized Rifle Platoon capability, for the Conduct Fire Engagement order, shall permit GUI designation of a movement speed. Note: The default is 15 km/hr.	D
222-1206	The Motorized Rifle Platoon capability, for the Conduct Fire Engagement order, shall provide parametric data values for the following: a. serious friendly loss percentage (default of 50%) b. firing position proximity (default of 100 meters)	I
222-1207	The Motorized Rifle Platoon capability, for the Conduct Fire Engagement order, shall execute HVY-0328 Traveling order, passing the following parameters: a. route = line from current platoon location to a point located a parameterized "firing position proximity" distance behind the center of the designated firing position b. travel type = "cross country" c. movement speed = designated movement speed d. catch-up speed = 0.0 e. formation = designated platoon formation	D
222-1208	The Motorized Rifle Platoon capability, for the Conduct Fire Engagement order, shall terminate the HVY-0328 Traveling order and execute the Common Threat Behaviors Occupy Defensive Position capability, passing the following parameters, when the first vehicle is within the parameterized "firing position proximity" of the designated firing position: a. defensive position = designated firing position b. enemy direction = azimuth from firing position to designated target location	D
222-1209	The Motorized Rifle Platoon capability, for the Conduct Fire Engagement order, shall set the fire permissions of the unit to "free."	D
222-1210	The Motorized Rifle Platoon capability, for the Conduct Fire Engagement order, shall send a "friendly losses" report on the company radio network when a parameterized serious friendly loss percentage has been exceeded.	D
222-1211	The Motorized Rifle Platoon capability, for the Conduct Fire Engagement order, shall continuously monitor enemy contact and shall perform the following actions when the enemy force is perceived to have been destroyed or retreated: a. send report on the company radio network, detailing the enemy destroyed and the friendly losses b. reset fire permissions to their previous values c. terminate the Conduct Fire Engagement order Design Note: See the Conceptual Model for a description of the algorithm for determining when the enemy force is perceived to have been destroyed or retreated.	D

HVY-0326 Assault An Enemy Position		
222-1301	The Motorized Rifle Platoon capability, for the Assault An Enemy Position order, shall execute the Common Threat Behavior Assault capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D
HVY-0327 Occupy a Temporary Defensive Position		
222-1401	The Motorized Rifle Platoon capability, for the Occupy a Temporary Defensive Position order, shall execute the Common Threat Behaviors Occupy Defensive Position capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D
HVY-0328 Traveling		
222-1501	The Motorized Rifle Platoon capability, for the Traveling order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D
222-1502	The Motorized Rifle Platoon capability, for the Traveling order, shall send a "start of traveling" report on the company radio network when the order execution begins.	D
222-1503	The Motorized Rifle Platoon capability, for the Traveling order, shall send a "completion of traveling" report on the company radio network when the order execution completes.	D

3.1.3 Motorized Rifle Company Capability

The Motorized Rifle Company Capability represents the physical modeling of a Motorized Rifle Company unit and its behavioral characteristics pertaining to the following CISs:

- HVY-0407 Conduct A Tactical Road March
- HVY-0408 Traveling
- HVY-0412 Attack From The March
- HVY-0413 Assault An Enemy Position
- HVY-0415 Execute A Fire Engagement
- HVY-0418 Occupy a Temporary Defensive Position
- HVY-0429 Conduct A Meeting Engagement

Requirement Number	Motorized Rifle Company Capability Requirements	Qualification Method
Unit Creation		
222-2001	The Motorized Rifle Company capability shall permit GUI creation of a Motorized Rifle Company comprising the following quantities and unit types: 3 - Motorized Rifle Platoons (BMP-1) 1 - Company headquarters vehicle (BMP-1)	D
222-2002	The Motorized Rifle Company capability shall permit GUI creation of a Motorized Rifle Company comprising the following quantities and unit types: 3 - Motorized Rifle Platoons (BMP-2)	D

	1 - Company headquarters vehicle (BMP-2)	
222-2003	The Motorized Rifle Company capability shall permit GUI creation of a Motorized Rifle Company comprising the following quantities and unit types: 3 - Motorized Rifle Platoons (BTR-80) 1 - Company headquarters vehicle (BTR-80)	D
HVY-0407 Conduct A Tactical Road March		
222-2101	The Motorized Rifle Company capability, for the Conduct Tactical Road March order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI. Note: The default for the Travel Type parameter is "roadmarch," and the default for the Formation parameter is "roadmarch column." All other parameters will display the same defaults as used by the Common Threat Behavior Movement capability.	D
222-2102	The Motorized Rifle Company capability, for the Conduct A Tactical Road March order, shall send a "start of tactical road march" report on the battalion radio network when the order execution begins.	D
222-2103	The Motorized Rifle Company capability, for the Conduct A Tactical Road March order, shall send a "completion of tactical road march" report on the battalion radio network when the order execution completes.	D
HVY-0408 Traveling		
222-2201	The Motorized Rifle Company capability, for the Traveling order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D
222-2202	The Motorized Rifle Company capability, for the Traveling order, shall send a "start of tactical road march" report on the battalion radio network when the order execution begins.	D
222-2203	The Motorized Rifle Company capability, for the Traveling order, shall send a "completion of tactical road march" report on the battalion radio network when the order execution completes.	D
HVY-0412 Attack From The March		
222-2301	The Motorized Rifle Company capability, for the Attack From The March order, shall model an attack from the march, based on the following parameters: a. march route b. line of deployment (into platoon columns) c. line of attack d. platoon attack formation e. dismounted attack switch f. squad assault formation (if dismounted attack switch is on) g. dismount line (if dismounted attack switch is on) h. objective position i. attack continuation switch (used to continue attack beyond objective) j. attack continuation direction (if attack continuation switch is on) k. attack continuation distance (if attack continuation switch is on)	I

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	l. desired march speed m. platoon spacing during the attack n. vehicle spacing during the attack o. assault type (frontal or flank) p. designated overwatch platoon (if flank attack is specified)	
222-2302	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of the march route. Note: This shall be a required input on the GUI (no default.)	D
222-2303	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of the line of deployment. Note: This shall be a required input on the GUI (no default.)	D
222-2304	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of the line of attack. Note: This shall be a required input on the GUI (no default.)	D
222-2305	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of the platoon attack formation, as follows: a. wedge b. vee c. line d. echelon-left e. echelon-right Note: The default is "line."	D
222-2306	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of a dismounted attack switch. Note: The default is "no dismount."	D
222-2307	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of the squad assault formation. Note: The default is "line."	D
222-2308	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of the dismount line when dismounted attack switch is on. Note: No default will be provided for the dismount line. If the dismounted attack switch is on and no attack line is designated from the GUI, no dismount will occur.	D
222-2309	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of the objective position as a point on the PVD. Note: This shall be a required input on the GUI (no default.)	D
222-2310	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of an attack continuation	D

	switch. This indicates whether the attack will continue beyond the objective position. Note: The default is "no attack continuation."	
222-2311	The Common Threat Behaviors capability, for the Attack From The March order, shall permit GUI designation of the direction and distance of continued attack (by selecting a point on the PVD) when the attack continuation switch is on. Note: No default will be provided for the attack continuation direction and distance. If the attack continuation switch is on and no point has been selected on the PVD to indicate the attack continuation distance and direction, no attack continuation will occur.	D
222-2312	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of the march speed. Note: The default is 25 km/hr.	D
222-2313	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of the platoon spacing used during the attack. Note: The default is 200 m.	D
222-2314	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of the vehicle spacing used during the attack. Note: The default is 50 m.	D
222-2315	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of the assault type with the following options: a. frontal b. flank Note: The default is "frontal."	D
222-2316	The Motorized Rifle Company capability, for the Attack From The March order, shall permit GUI designation of the overwatch platoon, if the specified assault type is "flank." Note: No default will be provided for this input. If no overwatch platoon is selected, the assault type will revert to "frontal."	D
222-2317	The Motorized Rifle Company capability, for the Attack From The March order, shall provide parametric data values for the following: a. friendly loss threshold (default of 50%) b. attack line proximity (default 100 meters)	I
222-2318	The Motorized Rifle Company capability, for the Attack From The March order, shall execute the HVY-0407 Conduct A Tactical Road March order, passing the following parameters: a. route = designated march route b. movement speed = desired march speed	D
222-2319	The Motorized Rifle Company capability, for the Attack From The March order, shall end execution of the Conduct A Tactical Road	D

	March order when the first company vehicle crosses the line of deployment.	
222-2320	The Motorized Rifle Company capability, for the Attack From The March order, shall execute the HVY-0408 Traveling order when the first company vehicle crosses the line of deployment, passing the following parameters: a. route = designated march route b. travel type = "cross country" c. spacing = designated platoon spacing during the attack d. sub-spacing = designated vehicle spacing during the attack e. movement speed = desired march speed f. catch-up speed = 0.0 g. formation = "line" h. sub-formation = "column"	D
222-2321	The Motorized Rifle Company capability, for the Attack From The March order, shall update the HVY-0408 Traveling order, passing the following parameters, when the first company vehicle arrives within a parameterized proximity to the line of attack: a. sub-formation = platoon attack formation	D
222-2322	The Motorized Rifle Company capability, for the Attack From The March order, shall end execution of the Traveling order when a company vehicle crosses the line of attack.	D
222-2323	The Motorized Rifle Company capability, for the Attack From The March order, shall execute the HVY-0413 Assault An Enemy Position order when the first company vehicle crosses the line of attack, passing the following parameters: a. objective position b. assault type c. platoon assault formation d. assault speed = maximum vehicle speed e. platoon spacing during the attack f. vehicle spacing during the attack g. dismounted assault switch h. squad assault formation i. dismount line j. attack continuation switch k. attack continuation direction l. attack continuation distance	D
222-2324	The Motorized Rifle Company capability, for the Attack From The March order, shall send a "crossing the line of attack" report on the battalion radio network when the first company vehicle crosses the line of attack.	D
HVY-0413 Assault An Enemy Position		
222-2401	The Motorized Rifle Company capability, for the Assault An Enemy Position order, shall model an assault, based on the following parameters: a. objective position b. assault type (frontal or flank) c. platoon assault formation d. assault speed e. platoon spacing f. vehicle spacing	I

	<ul style="list-style-type: none"> g. dismounted assault switch h. squad assault formation (if dismounted switch is on) i. dismount line (if dismounted assault switch is on) j. attack continuation switch (used to continue attack beyond objective) k. attack continuation direction (if attack continuation switch is on) l. attack continuation distance (if attack continuation switch is on) m. designated overwatch platoon (if flank assault type is selected) 	
222-2402	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the objective position as a point on the PVD.</p> <p>Note: This shall be a required input on the GUI (no default.)</p>	D
222-2403	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the assault type with the following options:</p> <ul style="list-style-type: none"> a. frontal b. flank <p>Note: The default is "frontal."</p>	D
222-2404	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the platoon assault formation, as follows:</p> <ul style="list-style-type: none"> a. wedge b. vee c. line d. echelon-left e. echelon-right <p>Note: The default is "line."</p>	D
222-2405	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the assault speed.</p> <p>Note: The default is 15 km/hr.</p>	D
222-2406	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the platoon spacing used during the attack.</p> <p>Note: The default is 200 m.</p>	D
222-2407	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the vehicle spacing used during the attack.</p> <p>Note: The default is 50 m.</p>	D
222-2408	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall permit GUI designation of a dismounted assault switch.</p> <p>Note: The default is "no dismount."</p>	D
222-2409	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the squad assault formation.</p>	D

	Note: The default is "line."	
222-2410	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the dismount line when the dismounted assault switch is on.</p> <p>Note: No default will be provided for the dismount line. If the dismounted assault switch is on and no attack line is designated from the GUI, no dismount will occur.</p>	D
222-2411	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall permit GUI designation of an attack continuation switch.</p> <p>Note: This indicates whether the attack will continue beyond the objective position</p> <p>Note: The default is "no attack continuation."</p>	D
222-2412	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the direction and distance of continued attack (by selecting a point on the PVD) when the attack continuation switch is on.</p> <p>Note: No default will be provided for the attack continuation direction and distance. If the attack continuation switch is on and no point has been selected on the PVD to indicate the attack continuation distance and direction, no attack continuation will occur.</p>	D
222-2413	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the overwatch platoon, if the specified assault type is "flank."</p> <p>Note: No default will be provided for this input. If no overwatch platoon is selected, the assault type will revert to "frontal."</p>	D
222-2414	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall provide parametric data values for the following:</p> <ul style="list-style-type: none"> a. flanking assault path arc angle (default of 45 degrees) b. DI lead distance (default of 50 meters) c. company defensive position width (default of 1200 meters) d. friendly loss threshold (default of 50%) 	I
222-2415	The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall set the fire permission to "free" for every vehicle in the company upon initiation of the assault.	D
222-2416	The Motorized Rifle Company capability, for the Assault An Enemy Position order, shall compute an objective position for each platoon in the vicinity of the company objective position, such that the platoon objective positions are aligned perpendicular to the direction of assault and spaced at intervals equal to the designated platoon spacing.	D
222-2417	<p>The Motorized Rifle Company capability, for the Assault An Enemy Position order, shall execute HVY-0326 Assault An Enemy Position order for each subordinate Motorized Rifle Platoon, passing the following parameters, if the specified assault type is "frontal":</p> <ul style="list-style-type: none"> a. platoon objective position b. platoon assault formation 	D

	<ul style="list-style-type: none"> c. squad assault formation d. assault speed e. vehicle spacing f. assault continuation switch g. direction of continued assault h. continued assault distance i. dismounted assault switch j. dismount line k. assault type = "frontal" 	
222-2418	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall execute HVY-0327 Occupy a Temporary Defensive Position order for the designated overwatch platoon, passing the following parameters, if the assault type is "flank":</p> <ul style="list-style-type: none"> a. defensive position = platoon's current location b. enemy direction = azimuth from current location to company objective position 	D
222-2419	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall compute an arcing path for each assaulting platoon from its current location to its platoon objective position, with a parameterized arc angle, if the assault type is "flank."</p> <p>Design note: See the Conceptual Model for specification of the criterion for determine whether the paths arc to the left or right.</p>	D
222-2420	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall execute HVY-0328 Traveling order for each of the assaulting platoons, passing the following parameters, if the assault type is "flank":</p> <ul style="list-style-type: none"> a. route = arcing path to the platoon objective position b. travel type = "cross country" c. spacing = designated vehicle spacing d. movement speed = designated assault speed e. catch-up speed = 0.0 f. formation = designated platoon assault formation g. sub-formation = designated squad assault formation 	D
222-2421	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall execute HVY-0312 Dismount Vehicle for each assaulting platoon when its first vehicle crosses the dismount line, if the assault type is "flank."</p>	D
222-2422	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall execute HVY-0328 Traveling order for the overwatch platoon when the first vehicle of each assaulting platoon has reached the vicinity of its platoon objective position, passing the following parameters, if the assault type is "flank":</p> <ul style="list-style-type: none"> a. route = arcing path to the platoon objective position b. travel type = "cross country" c. spacing = designated vehicle spacing d. movement speed = designated assault speed e. catch-up speed = 0.0 f. formation = designated platoon assault formation g. sub-formation = designated squad assault formation 	D
222-2423	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall send a "seizure of the objective" report on the</p>	D

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	<p>battalion radio network when the first vehicle of each platoon has reached the vicinity of its platoon objective position.</p> <p>Note: This report shall include the number of enemy platforms destroyed and the number of friendly losses.</p>	
222-2424	The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall execute HVY-0316 Remount Vehicle order for each platoon when all platoons have reached the vicinity of their objective positions.	D
222-2425	The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall reset the fire permissions for all vehicles in the company to their previous values, when all platoons have reached the vicinity of their objective positions, if the attack continuation switch is off.	D
222-2426	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall execute HVY-0418 Occupy a Temporary Defensive Position order, passing the following parameters, when all platoons have reached the vicinity of their objective positions, if the attack continuation switch is off:</p> <ul style="list-style-type: none"> a. defensive position = line of parameterized "company defensive position width" length centered at the objective position, perpendicular to direction of assault b. enemy direction = direction of assault <p>Note: The direction of assault is the direction from the company's centroid at the initiation of the assault to the company's objective position.</p>	D
222-2427	<p>The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall execute HVY-0408 Traveling order, passing the following parameters, when all platoons have reached the vicinity of their objective positions, if the attack continuation switch is on:</p> <ul style="list-style-type: none"> a. Route = line beginning at company objective position and extending for designated attack continuation length in designated attack continuation direction b. travel type = "cross country" c. spacing = designated platoon spacing d. sub-spacing = designated vehicle spacing e. movement speed = designated assault speed f. catch-up speed = 0.0 g. formation = "line" h. sub-formation = platoon assault formation 	D
222-2428	The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall reset the fire permissions for all vehicles in the company to their previous values, when all platoons have traveled the designated attack continuation distance, if the attack continuation switch is off.	D
222-2429	The Motorized Rifle Company capability, for the Assault an Enemy Position order, shall send a "serious friendly loss" report on the battalion radio network when the parameterized friendly loss threshold has been exceeded.	D
HVY-0415 Execute A Fire Engagement		
222-2501	The Motorized Rifle Company capability, for the Execute Fire	I

	Engagement order, shall model the execution of a fire engagement, based on the following parameters: a. company formation b. platoon formation c. firing position (line or piecewise linear curve) d. target location (point) e. movement speed	
222-2502	The Motorized Rifle Company capability, for the Execute Fire Engagement order, shall permit GUI designation of a company formation. Note: The default is "line."	D
222-2503	The Motorized Rifle Company capability, for the Execute Fire Engagement order, shall permit GUI designation of a platoon formation. Note: The default is "line."	D
222-2504	The Motorized Rifle Company capability, for the Execute Fire Engagement order, shall permit GUI designation of a firing position as a line on the PVD. Note: This shall be a required input on the GUI (no default.)	D
222-2505	The Motorized Rifle Company capability, for the Execute Fire Engagement order, shall permit GUI designation of a target location as a point on the PVD. Note: This shall be a required input on the GUI (no default.)	D
222-2506	The Motorized Rifle Company capability, for the Execute Fire Engagement order, shall permit GUI designation of a movement speed. Note: The default is 15 km/hr.	D
222-2507	The Motorized Rifle Company capability, for the Execute Fire Engagement order, shall provide parametric data values for the following: a. Serious friendly loss percentage (default of 50%) b. firing position proximity (default of 100 meters)	I
222-2508	The Motorized Rifle Company capability, for the Execute Fire Engagement order, shall execute HVY-0408 Traveling order, passing the following parameters: a. route = line from current company location (centroid) to a point located a parameterized "firing position proximity" distance behind the center of the designated firing position b. travel type = "cross country" c. movement speed = designated movement speed d. catch-up speed = 0.0 e. formation = designated company formation f. sub-formation = designated platoon formation	D
222-2509	The Motorized Rifle Company capability, for the Execute Fire Engagement order, shall terminate the execute the HVY-0408 Traveling order and execute HVY-0418 Occupy a Temporary Defensive Position order, passing the following parameters, when the first vehicle is within the parameterized "defensive position proximity"	D

	<p>of the designated firing position:</p> <p>a. defensive position = designated firing position</p> <p>b. enemy direction = azimuth from firing position to designated target location</p>	
222-2510	The Motorized Rifle Company capability, for the Execute Fire Engagement order, shall set the fire permissions of the unit to "free."	D
222-2511	The Motorized Rifle Company capability, for the Execute Fire Engagement order, shall send a "friendly losses" report on the company radio network when a parameterized serious friendly loss percentage has been exceeded.	D
222-2512	<p>The Motorized Rifle Company capability, for the Execute Fire Engagement order, shall continuously monitor enemy contact and shall perform the following actions when the enemy force is perceived to have been destroyed or retreated:</p> <p>a. send report on the battalion radio network, detailing the enemy destroyed and the friendly losses</p> <p>b. reset fire permissions to their previous values</p> <p>c. terminate the Execute Fire Engagement order</p> <p>Design Note: See the Conceptual Model for a description of the algorithm for determining when the enemy force is perceived to have been destroyed or retreated.</p>	D
HVY-0418 Occupy a Temporary Defensive Position		
222-2601	<p>The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall model the occupation of a temporary defensive position, based on the following parameters:</p> <p>a. defensive position (line or piecewise linear curve)</p> <p>b. engagement area (point)</p>	D
222-2602	<p>The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall permit GUI designation of a defensive position as a line (or piecewise linear curve) on the PVD.</p> <p>Note: This shall be a required input on the GUI (no default.)</p>	D
222-2603	<p>The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall permit GUI designation of an engagement area as a point on the PVD.</p> <p>Note: This shall be a required input on the GUI (no default.)</p>	D
222-2604	<p>The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall provide parametric data values for the following:</p> <p>a. single echelon width criterion (default of 1500 meters)</p> <p>b. distance between echelons (default of 500 meters)</p> <p>c. commander position offset (default of 100 meters)</p> <p>d. platoon position width (default of 400 meters)</p>	I
222-2605	The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall defend in one echelon when the GUI selected defensive position line is greater than the parameterized "single echelon width criterion."	D
222-2606	The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall defend in two echelons when GUI	D

	selected defensive position line is less than or equal to the parameterized "single echelon width criterion."	
222-2607	The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall determine a desired position for all three platoons by computing three equally spaced points along the defensive position, when defending in one echelon.	D
222-2608	The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall determine a desired position for the first two platoons by computing two equally spaced points along the defensive position, when defending in two echelons.	D
222-2609	The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall determine a desired position for the third platoon of the Company unit at the parameterized "distance between echelons" distance behind the center of the defensive position, when defending in two echelons.	D
222-2610	The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall determine a desired position for the Company Commander at a parameterized "commander position offset" behind the defensive position.	D
222-2611	The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall execute HVY-0327 Occupy a Temporary Defensive Position for each platoon, passing the following parameters: a. defensive position = line through the desired position for the platoon, with length equal to the parameterized "platoon position width," oriented along the segment of the designated company defensive position on which the desired platoon position is situated b. enemy direction = azimuth from desired platoon position to designated engagement area	D
222-2612	The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall execute the Common Threat Behavior Occupy Defensive Position capability for the company commander, passing the following parameters: a. defensive position = line of arbitrary length centered at the desired position for the company commander, oriented perpendicular to the azimuth from the desired position to the designated engagement area b. enemy direction = azimuth from the desired position to the designated engagement area	D
222-2613	The Motorized Rifle Company capability, for the Occupy a Temporary Defensive Position order, shall send a "in position" report on the battalion radio network when all vehicles have arrived at their primary firing positions.	D
HVY-0429 Conduct A Meeting Engagement		
222-2701	The Motorized Rifle Company capability, for the Conduct A Meeting Engagement behavior, shall provide parametric data values for the following: a. company friendly loss threshold (default of 50%) b. platoon objective separation (default of 200 meters)	I
222-2702	The Motorized Rifle Company capability, for the Conduct A Meeting Engagement behavior, shall set the fire permissions to "free" for the	D

	<p>platoon receiving initial enemy contact (which shall be designated as the overwatch platoon.)</p> <p>Note: This behavior will only be executed as a situational interrupt, based on enemy contact. Thus, there is guaranteed to be at least one platoon that has received enemy contact at the initiation of this behavior. If more than one platoon has received contact, one of them will be arbitrarily selected as the "platoon receiving initial enemy contact."</p>	
222-2703	<p>The Motorized Rifle Company capability, for the Conduct A Meeting Engagement behavior, shall execute the HVY-0327 Occupy a Temporary Defensive Position order, passing the following parameters, for the overwatch platoon:</p> <ul style="list-style-type: none"> a. defensive position = platoon's current location b. enemy direction = azimuth from centroid of current location to centroid of detected enemy platforms 	D
222-2704	<p>The Motorized Rifle Company capability, for the Conduct A Meeting Engagement behavior, shall execute HVY-0326 Assault An Enemy Position order for each of the non-overwatch platoons, passing the following parameters:</p> <ul style="list-style-type: none"> a. objective position = vicinity of centroid of detected enemy platforms b. platoon formation = "line" c. assault speed = maximum vehicle speed d. assault continuation switch = "off" e. dismounted assault switch = "off" f. assault type = "frontal" <p>Note: Objective positions for each platoon will be separated by a parameterized "platoon objective separation."</p>	D
222-2705	<p>The Motorized Rifle Company capability, for the Conduct A Meeting Engagement behavior, shall continually monitor company's losses and when losses exceed a parameterized "company friendly loss threshold," the platoon Assault An Enemy Position orders will be terminated and the behavior will execute the HVY-0327 Occupy a Temporary Defensive Position order for each non-overwatch platoon, passing the following parameters:</p> <ul style="list-style-type: none"> a. defensive position = current location b. enemy direction = azimuth from current location to centroid of detected enemy platforms 	D
222-2706	<p>The Motorized Rifle Company capability, for Conduct A Meeting Engagement behavior, shall perform the following actions when either (1) the enemy force is perceived to have retreated or been destroyed or (2) one of the platoons arrives at the location of its assault objective:</p> <ul style="list-style-type: none"> a. send a report on the battalion radio network indicating the seizure of the objective and detailing the enemy destroyed and friendly losses b. reset fire permissions to their previous values c. terminate the Conduct A Meeting Engagement behavior. 	D

3.1.4 Tank Platoon Capability

The Tank Platoon Capability represents the physical modeling of a Tank Platoon unit and its behavioral characteristics pertaining to the following CIs:

- HVY-0014 Conduct Tactical Road March
- HVY-0022 Assault An Enemy Position
- HVY-0028 Traveling

Requirement Number	Tank Platoon Capability Requirements	Qualification Method
Unit Creation		
222-3001	The Tank Platoon capability shall permit GUI creation of a Tank Platoon comprising the following quantities and unit types: 3 - T-72 tanks	D
222-3002	The Tank Platoon capability shall permit GUI creation of a Tank Platoon comprising the following quantities and unit types: 3 - T-80 tanks	D
HVY-0014 Conduct Tactical Road March		
222-3101	The Tank Platoon capability, for the Conduct Tactical Road March order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI. Note: The default value for the Travel Type parameter is "roadmarch," and the default for the Formation parameter is "column." The defaults for all other parameters will be the same as used by the Common Threat Behavior Movement capability.	D
222-3102	The Tank Platoon capability, for the Conduct A Tactical Road March order, shall send a "start of tactical road march" report on the company radio network when the order execution begins.	D
222-3103	The Tank Platoon capability, for the Conduct A Tactical Road March order, shall send a "completion of tactical road march" report on the company radio network when the order execution completes.	D
HVY-0022 Assault An Enemy Position		
222-3201	The Tank Platoon capability, for the Assault An Enemy Position order, shall execute the Common Threat Behavior Assault capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D
HVY-0028 Traveling		
222-3301	The Tank Platoon capability, for the Traveling order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D
222-3302	The Tank Platoon capability, for the Traveling order, shall send a "start of traveling" report on the company radio network when the order execution begins.	D
222-3303	The Tank Platoon capability, for the Traveling order, shall send a "completion of traveling" report on the company radio network when	D

	the order execution completes.	
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3.1.5 Tank Company Capability

The Tank Company Capability represents the physical modeling of a Tank Company unit and its behavioral characteristics pertaining to the following CISs:

- SOV-0107 Conduct A Tactical Road March
- SOV-0108 Traveling
- SOV-0113 Assault An Enemy Position

Requirement Number	Tank Company Capability Requirements	Qualification Method
Unit Creation		
222-4001	The Tank Company capability shall permit GUI creation of a Tank Company comprising the following quantities and unit types: 3 - Tank Platoons (T-72) 1 - Company headquarters vehicle (T-72)	D
222-4002	The Tank Company capability shall permit GUI creation of a Tank Company comprising the following quantities and unit types: 3 - Tank Platoons (T-80) 1 - Company headquarters vehicle (T-80)	D
SOV-0107 Conduct A Tactical Road March		
222-4101	The Tank Company capability, for the Conduct A Tactical Road March order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI. Note: The default value for the Travel Type parameter is "roadmarch," and the default for the Formation parameter is "column." The defaults for all other parameters will be the same as those specified for the Common Threat Behavior Movement capability.	D
222-4102	The Tank Company capability, for the Conduct A Tactical Road March order, shall send a "start of tactical road march" report on the battalion radio network when the order execution begins.	D
222-4103	The Tank Company capability, for the Conduct A Tactical Road March order, shall send a "completion of tactical road march" report on the battalion radio network when the order execution completes.	D
SOV-0108 Traveling		
222-4201	The Tank Company capability, for the Traveling order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D
222-4202	The Tank Company capability, for the Traveling order, shall send a "start of traveling" report on the battalion radio network when the order execution begins.	D
222-4203	The Tank Company capability, for the Traveling order, shall send a "completion of traveling" report on the battalion radio network when the order execution completes.	D
SOV-0113 Assault An Enemy Position		

222-4301	The Tank Company capability, for the Assault An Enemy Position order, shall model an assault, based on the following parameters: a. objective position b. platoon assault formation c. assault speed d. platoon spacing e. vehicle spacing f. attack continuation switch (used to continue attack beyond objective) g. attack continuation direction (if attack continuation switch is on) h. attack continuation distance (if attack continuation switch is on)	I
222-4302	The Tank Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the objective position as a point on the PVD. Note: This shall be a required input on the GUI (no default.)	D
222-4303	The Tank Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the platoon assault formation, as follows: a. wedge b. vee c. line d. echelon-left e. echelon-right Note: The default is "line."	D
222-4304	The Tank Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the assault speed. Note: The default is 15 km/hr.	D
222-4305	The Tank Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the platoon spacing used during the attack. Note: The default is 200 m.	D
222-4306	The Tank Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the vehicle spacing used during the attack. Note: The default is 50 m.	D
222-4307	The Tank Company capability, for the Assault an Enemy Position order, shall permit GUI designation of an attack continuation switch. Note: This indicates whether the attack will continue beyond the objective position Note: The default is "no attack continuation."	D
222-4308	The Tank Company capability, for the Assault an Enemy Position order, shall permit GUI designation of the direction and distance of continued attack (by selecting a point on the PVD) when the attack continuation switch is on.	D

	Note: No default will be provided for the attack continuation direction and distance. If the attack continuation switch is on and no point has been selected on the PVD to indicate the attack continuation distance and direction, no attack continuation will occur.	
222-4309	The Tank Company capability, for the Assault an Enemy Position order, shall provide parametric data values for the following: a. friendly loss threshold (default of 50%)	I
222-4310	The Tank Company capability, for the Assault an Enemy Position order, shall set the fire permission to "free" for every vehicle in the company upon initiation of the assault.	D
222-4311	The Tank Company capability, for the Assault An Enemy Position order, shall compute an objective position for each platoon in the vicinity of the company objective position, such that the platoon objective positions are aligned perpendicular to the direction of assault and spaced at intervals equal to the designated platoon spacing.	D
222-4312	The Tank Company capability, for the Assault An Enemy Position order, shall execute HVY-0022 Assault An Enemy Position order for each subordinate Tank Platoon, passing the following parameters: a. platoon objective position b. platoon assault formation c. assault speed d. vehicle spacing e. assault continuation switch f. direction of continued assault g. continued assault distance h. dismounted assault switch = "no dismount" i. assault type = "frontal"	D
222-4313	The Tank Company capability, for the Assault an Enemy Position order, shall send a "seizure of the objective" report on the battalion radio network when the first vehicle of each platoon has reached the vicinity of its platoon objective position. Note: This report shall include the number of enemy platforms destroyed and the number of friendly losses.	D
222-4314	The Tank Company capability, for the Assault an Enemy Position order, shall reset the fire permissions for all vehicles in the company to their previous values, when all platoons have reached the vicinity of their objective positions, if the attack continuation switch is off.	D
222-4315	The Tank Company capability, for the Assault an Enemy Position order, shall reset the fire permissions for all vehicles in the company to their previous values, when all platoons have traveled the designated attack continuation distance beyond their objective positions, if the attack continuation switch is on.	D
222-4316	The Tank Company capability, for the Assault an Enemy Position order, shall send a "serious friendly loss" report on the battalion radio network when the parameterized friendly loss threshold has been exceeded.	D

3.1.6 ATGM Squad Capability

The ATGM Squad Capability represents the physical modeling of a ATGM Squad unit and its behavioral characteristics pertaining to the following CISS:

Traveling
HVY-2101 Occupy a Defensive Position

Requirement Number	ATGM Squad Capability Requirements	Qualification Method
Unit Creation		
111-0001	The ATGM Squad capability shall permit GUI creation of a ATGM Squad comprising the following quantities and unit types: 1 - BMP-1 1 - ATGM Section	D
111-0002	The ATGM Squad capability shall permit GUI creation of a ATGM Squad comprising the following quantities and unit types: 1 - BMP-2 1 - ATGM Section	D
111-0003	The ATGM Squad capability shall permit GUI creation of a ATGM Squad comprising the following quantities and unit types: 1 - BTR-80 1 - ATGM Section	D
111-0004	The ATGM Squad capability shall represent an ATGM Section comprising the following quantities and weapon types: 2 - AT4/Spigot (missile launchers) 1 - RPG-22 (grenade launcher) 3 - AKM Avtomat Kalashnikov (assault rifles)	D
Traveling		
111-0101	The ATGM Squad capability, for the Traveling order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D
111-0102	The ATGM Squad capability, for the Traveling order, shall send a "start of traveling" report on the company radio network when the order execution begins.	D
111-0103	The ATGM Squad capability, for the Traveling order, shall send a "completion of traveling" report on the company radio network when the order execution completes.	D
HVY-2101 Occupy a Defensive Position		
111-0201	The ATGM Squad capability, for the Occupy a Defensive Position order, shall execute the Common Threat Behavior Occupy Defensive Position capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D

3.1.7 Anti-Tank Platoon Capability

The Anti-Tank Platoon Capability represents the physical modeling of a Anti-Tank Platoon unit and its behavioral characteristics pertaining to the following CISs:

Traveling
HVY-2003 Occupy a Defensive Position

Requirement Number	Anti-Tank Platoon Capability Requirements	Qualification Method
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Unit Creation		
111-1001	The Anti-Tank Platoon capability shall permit GUI creation of a Anti-Tank Platoon comprising the following quantities and unit types: 3 - ATGM Squads (BMP-1)	D
111-1002	The Anti-Tank Platoon capability shall permit GUI creation of a Anti-Tank Platoon comprising the following quantities and unit types: 3 - ATGM Squads (BMP-2)	D
111-1003	The Anti-Tank Platoon capability shall permit GUI creation of a Anti-Tank Platoon comprising the following quantities and unit types: 3 - ATGM Squads (BTR-80)	D
Traveling		
111-1101	The Anti-Tank Platoon capability, for the Traveling order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D
111-1102	The Anti-Tank Platoon capability, for the Traveling order, shall send a "start of traveling" report on the company radio network when the order execution begins.	D
111-1103	The Anti-Tank Platoon capability, for the Traveling order, shall send a "completion of traveling" report on the company radio network when the order execution completes.	D
HVY-2003 Occupy a Defensive Position		
111-1201	The ATGM Platoon capability, for the Occupy a Defensive Position order, shall execute the Common Threat Behavior Occupy Defensive Position capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D

3.1.8 Self-Propelled Howitzer Battery Capability

The Self-Propelled Howitzer Battery Capability represents the physical modeling of a Self-Propelled Howitzer Battery unit and its behavioral characteristics pertaining to the following CISs:

- SOV-0702 Conduct Tactical Road March
- SOV-0706 Occupy Firing Position
- SOV-0709 Conduct Unobserved Fire Mission

Requirement Number	Self-Propelled Howitzer Battery Capability Requirements	Qualification Method
Unit Creation		
222-5001	The Self-Propelled Howitzer Battery capability shall permit GUI creation of a Self-Propelled Howitzer Battery comprising the following quantities and unit types: 6 - 2S1 122mm self-propelled howitzers 1 - 1V13 Fire Direction Center vehicle 1 - 1V14 Command Observation Post vehicle 6 - URAL-375 cargo carrier trucks	D
SOV-0702 Conduct Tactical Road March		
222-5101	The Self-Propelled Howitzer Battery capability, for the Conduct Tactical Road March order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when	D

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	being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI. Note: The default for the Travel Type parameter is "roadmarch," and the default for the Formation parameter is "column." The defaults for all other parameters will be the same as those specified for the Common Threat Behavior Movement capability.	
222-5102	The Self-Propelled Howitzer Battery capability, for the Conduct A Tactical Road March order, shall send a "start of tactical road march" report on the battalion radio network when the order execution begins.	D
222-5103	The Self-Propelled Howitzer Battery capability, for the Conduct A Tactical Road March order, shall send a "completion of tactical road march" report on the battalion radio network when the order execution completes.	D
SOV-0706 Occupy Firing Position		
222-5201	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall use the following parameters: a. road march route b. formation c. road march speed d. road march vehicle spacing e. primary direction of fire f. firing position location	I
222-5202	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall permit GUI designation of the road march route. Note: The default will be a line from the unit's current location to the firing position location.	D
222-5203	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall permit GUI designation of the Battery Formation as one of the following: a. wedge b. vee c. line d. echelon-left e. echelon-right Note: The default is "line."	D
222-5204	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall permit GUI designation of the Road March Speed. Note: The default is 30 km/hr.	D
222-5205	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall permit GUI designation of the Vehicle Spacing. Note: The default is 50 meters.	D
222-5206	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall permit GUI designation of the Primary Direction of Fire.	D

	Note: This shall be a required input on the GUI (no default.)	
222-5207	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall permit GUI designation of the Firing Position Location as a point on the PVD. Note: This shall be a required input on the GUI (no default.)	D
222-5208	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall provide parametric data values for the following: a. gun search zone width (default of 20 meters) b. gun search zone depth (default of 50 meters) c. gun spacing offset (default of 40 meters) d. FDC zone offset (default of 60 meters) e. FDC search zone depth (default of 40 meters) f. ammo vehicles zone offset (default of 250 meters) g. ammo vehicles spacing (default of 50 meters) h. ammo vehicles zone depth (default of 100 meters) i. minimum emplacement time delay (default of 3 minutes) j. maximum emplacement time delay (default of 5 minutes)	D
222-5209	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall move to the Firing Position by executing SOV-0702 Conduct Tactical Road March for the battery, passing the following parameters: a. route = designated route b. travel type = "road march" c. formation = designated battery formation d. speed = designated road march speed e. catch-up speed = 0.0 f. spacing = designated road march vehicle spacing Note: This provides movement to the firing position.	D
222-5210	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall compute a line, known as the line of metal, which is perpendicular to the primary direction of fire and passes through the specified Firing Position location. Note: The line of metal serves as a reference line from which the positions of battery vehicles are determined	I
222-5211	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall employ the existing ModSAF terrain reasoning algorithm to calculate a covered and concealed location for gun #3, using a rectangular search area specified as follows: a. center is located a parameterized "gun spacing offset" distance to the right of the specified firing position location (along the line of metal.) b. width is the parameterized "gun search zone width." c. depth is the parameterized "gun search zone depth."	D
222-5212	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall employ the existing ModSAF terrain reasoning algorithm to calculate a covered and concealed location for gun #2, using a rectangular search area specified as follows: a. center is located a parameterized "gun spacing offset" distance to the right of the calculated covered/concealed position for gun #3	D

	(projected onto the line of metal.) b. width is the parameterized "gun search zone width." c. depth is the parameterized "gun search zone depth."	
222-5213	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall employ the existing ModSAF terrain reasoning algorithm to calculate a covered and concealed location for gun #1, using a rectangular search area specified as follows: a. center is located a parameterized "gun spacing offset" distance to the right of the calculated covered/concealed position for gun #2 (projected onto the line of metal.) b. width is the parameterized "gun search zone width." c. depth is the parameterized "gun search zone depth."	D
222-5214	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall employ the existing ModSAF terrain reasoning algorithm to calculate a covered and concealed location for gun #4, using a rectangular search area specified as follows: a. center is located a parameterized "gun spacing offset" distance to the left of the calculated covered/concealed position for gun #3 (projected onto the line of metal.) b. width is the parameterized "gun search zone width." c. depth is the parameterized "gun search zone depth."	D
222-5215	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall employ the existing ModSAF terrain reasoning algorithm to calculate a covered and concealed location for gun #5, using a rectangular search area specified as follows: a. center is located a parameterized "gun spacing offset" distance to the left of the calculated covered/concealed position for gun #4 (projected onto the line of metal.) b. width is the parameterized "gun search zone width." c. depth is the parameterized "gun search zone depth."	D
222-5216	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall employ the existing ModSAF terrain reasoning algorithm to calculate a covered and concealed location for gun #6, using a rectangular search area specified as follows: a. center is located a parameterized "gun spacing offset" distance to the left of the calculated covered/concealed position for gun #5 (projected onto the line of metal.) b. width is the parameterized "gun search zone width." c. depth is the parameterized "gun search zone depth."	D
222-5217	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall employ the existing ModSAF terrain reasoning algorithm to calculate a covered and concealed location for the FDC vehicle, using a rectangular search area specified as follows: a. center is located a parameterized "FDC zone offset" distance behind the specified firing position location b. width is the distance between firing positions for gun #2 and gun #5 (projected onto the line of metal) c. depth is the parameterized "FDC search zone depth."	D
222-5218	The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall employ the existing ModSAF terrain reasoning algorithm to calculate a covered and concealed location for the Command Observation Post vehicle, using a rectangular search area	D

	<p>specified as follows:</p> <ul style="list-style-type: none"> a. center is located a parameterized "gun spacing offset" distance to the right of the calculated covered/concealed position for the FDC. b. width is the parameterized "gun search zone width." c. depth is the parameterized "gun search zone width." 	
222-5219	<p>The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall employ the existing ModSAF terrain reasoning algorithm to calculate covered and concealed locations for the ammunition vehicles, using a rectangular search area specified as follows:</p> <ul style="list-style-type: none"> a. center is located a parameterized "ammo vehicles zone offset" distance behind the specified firing position location b. width is the distance between firing positions for gun #1 and gun #6 (projected onto the line of metal) c. depth is the parameterized "ammo vehicles zone depth." <p>Note: The locations of ammunition vehicles shall be required to be separated from one another by at least the parameterized "ammo vehicles spacing" distance.</p>	D
222-5220	<p>The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall move all vehicles of the battery to the previously calculated positions by executing the existing ModSAF Movement capability for each vehicle when the battery has reached the end point of the Tactical Road March route.</p>	D
222-5221	<p>The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall model emplacement delays by preventing the battery from conducting fire missions until an emplacement delay time has elapsed.</p> <p>Note: The emplacement delay is calculated by sampling a uniform distribution with parameterized minimum and maximum emplacement time delay values. This delay will commence when the last vehicle of the battery is in position.</p>	D
222-5222	<p>The Self-Propelled Howitzer Battery capability, for the Occupy Firing Position order, shall send a "positions occupied" report on the battalion radio network when all vehicles have arrived at their designated positions.</p>	D
SOV-0709	Conduct Unobserved Fire Mission	
222-5301	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall model the performance of an unobserved fire mission, based on the following parameters:</p> <ul style="list-style-type: none"> a. mission type b. target location (point) c. target type d. preferred munition type e. firing line separation f. target width g. target depth h. target axis orientation i. engagement timing j. firing duration at first target line k. firing duration at second target line 	I

222-5302	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall permit GUI designation of the mission type as one of the following:</p> <ul style="list-style-type: none"> a. successive fire concentration b. standing barrage c. unplanned <p>Note: This shall be a required input on the GUI (no default.)</p>	D
222-5303	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall permit GUI designation of a target location as a point on the PVD.</p> <p>Note: This shall be a required input on the GUI (no default.)</p>	D
222-5304	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall permit GUI designation of a target type, selected from the following choices:</p> <ul style="list-style-type: none"> a. heavy armor b. light armor c. resupply/utility vehicles d. personnel e. structure <p>Note: This shall be a required input on the GUI (no default.)</p>	D
222-5305	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall permit GUI designation of the munition type to be fired.</p> <p>Note: This shall be a required input on the GUI (no default.)</p>	D
222-5306	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall permit GUI designation of the firing line separation (distance between the first and second target lines), when the designated mission type is "successive fire concentration"</p> <p>Note: This shall be a required input on the GUI when "successive fire concentration" is selected.</p>	D
222-5307	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall permit GUI designation of the target width, when the designated mission type is "standing barrage."</p> <p>Note: This shall be a required input on the GUI when "standing barrage" is selected.</p>	D
222-5308	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall permit GUI designation of the target width and depth, when the designated mission type is "unplanned."</p> <p>Note: These shall be required inputs on the GUI when "unplanned" is selected.</p>	D
222-5309	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall permit GUI designation of the orientation of the target axis.</p>	D

	Note: This shall be a required input on the GUI (no default.)	
222-5310	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall permit GUI designation of the engagement timing, as one of the following:</p> <ul style="list-style-type: none"> a. time on target b. immediate c. at command <p>Note: The default is "immediate."</p>	D
222-5311	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall permit GUI designation of the firing duration at first target line, when the designated mission type is "successive fire concentration."</p> <p>Note: This shall be a required input on the GUI when "successive fire concentration" is selected.</p>	D
222-5312	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall permit GUI designation of the firing duration at second target line, when the designated mission type is "successive fire concentration."</p> <p>Note: This shall be a required input on the GUI when "successive fire concentration" is selected.</p>	D
222-5313	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall provide parametric data values for the following:</p> <ul style="list-style-type: none"> a. processing time delay for "time on target" engagement (default of 40 seconds) b. processing time delay for "immediate" engagement (default of 3 minutes) c. processing time delay for "at command" engagement (default of 40 seconds) d. number of volleys to fire (table dimensioned by target type, munition type, and target size) (default of 3 volleys) 	I
222-5314	<p>The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall orient its guns toward the target location.</p> <p>Note: Orientation includes azimuth and elevation.</p>	D
222-5315	The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall fire an initial volley of the designated munition at the target location after the parameterized processing time for the designated engagement timing option has elapsed.	D
222-5316	The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall, after firing the initial volley, continue firing with a time delay between volleys determined by the parameterized maximum firing rate, until the required number of volleys have been fired	D
222-5317	The Self-Propelled Howitzer Battery capability, for the Conduct	I

	Unobserved Fire Mission order, shall compute aimpoints for the rounds fired in each volley in accordance with the designated mission type. Design note: See Conceptual Model document for specification of algorithms for computing aimpoints.	
222-5318	The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall send a "firing has begun" report on the battalion radio network when the initial volley is fired.	D
222-5319	The Self-Propelled Howitzer Battery capability, for the Conduct Unobserved Fire Mission order, shall send a "firing has ended" report on the battalion radio network when the last volley is fired.	D

3.1.9 SA-16 Air Defense Platoon Capability

The SA-16 Air Defense Platoon Capability represents the physical modeling of a SA-16 Air Defense Platoon unit and its behavioral characteristics pertaining to the following CISs:

- HVY-1402 Conduct Tactical Road March
- HVY-1406 Occupy An Air Defense Firing Position
- HVY-1408 Engage An Aerial Target

Requirement Number	SA-16 Air Defense Platoon Capability Requirements	Qualification Method
Unit Creation		
111-2001	The SA-16 Air Defense Platoon capability shall permit GUI creation of a SA-16 Air Defense Platoon comprising the following quantities and unit types: 3 - BMP-1s 3 - SAM Squads	D
111-2002	The SA-16 Air Defense Platoon capability shall permit GUI creation of a SA-16 Air Defense Platoon comprising the following quantities and unit types: 3 - BMP-2s 3 - SAM Squads	D
111-2003	The SA-16 Air Defense Platoon capability shall represent a SAM Squad comprising the following quantities and weapon types: 3 - SA-16 (missile launchers) 3 - AKM Avtomat Kalashnikov (assault rifles)	D
HVY-1402 Conduct Tactical Road March		
111-2101	The SA-16 Air Defense Platoon capability, for the Conduct Tactical Road March order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI. Note: The default for the Travel Type parameter is "roadmarch," and the default for the Formation parameter is "column." All other parameters will display the same defaults as specified for the Common Threat Behavior Movement capability.	D
111-2102	The SA-16 Air Defense Platoon capability, for the Conduct A Tactical Road March order, shall send a "start of tactical road march" report on	D

	the company radio network when the order execution begins.	
111-2103	The SA-16 Air Defense Platoon capability, for the Conduct A Tactical Road March order, shall send a "completion of tactical road march" report on the company radio network when the order execution completes.	D
HVY-1406 Occupy An Air Defense Firing Position		
111-2201	The SA-16 Air Defense Platoon capability, for the Occupy an Air Defense Firing Position order, shall execute the Common Threat Behavior Occupy Defensive Position capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI.	D
HVY-1408 Engage An Aerial Target		
111-2301	The SA-16 Air Defense Platoon capability, for the Engage An Aerial Target order, shall utilize the following ModSAF VAssess parameters for the SA-16 missile launcher weapon's threat priorities of aircraft types (with decreasing priority): a. ground attack aircraft with anti-tank weapons b. other ground attack aircraft c. electronic countermeasures aircraft d. all other aircraft	D

3.1.10 2S6 Air Defense Battery Capability

The 2S6 Air Defense Battery Capability represents the physical modeling of a 2S6 Air Defense Battery unit and its behavioral characteristics pertaining to the following CISs:

- HVY-1504 Conduct Tactical Road March
- HVY-1505 Occupy Firing Position
- HVY-1507 Engage An Aerial Target
- HVY-1508 Employ Target Acquisition Radar
- HVY-1510 Provide Air Defense Coverage

Requirement Number	2S6 Air Defense Battery Capability Requirements	Qualification Method
Unit Creation		
111-3001	The 2S6 Air Defense Battery capability shall permit GUI creation of a 2S6 Air Defense Battery comprising the following quantities and unit types: 3 - 2S6 Air Defense Platoons 1 - Battery headquarters vehicle (BTR-60PU)	D
111-3002	The 2S6 Air Defense Battery capability shall represent a Air Defense Platoon comprising the following quantities and unit types: 2 - 2S6 air defense vehicles	D
HVY-1504 Conduct Tactical Road March		
111-3101	The 2S6 Air Defense Battery capability, for the Conduct Tactical Road March order, shall execute the Common Threat Behavior Movement capability and display its task editor (except when being executed from within another behavior as a subordinate task) to provide access to all task parameters through the GUI. Note: The default value for the Travel Type parameter is	D

	"roadmarch," and the default for the Formation parameter is "column." All other parameters will be displayed with the same defaults as specified for the Common Threat Behavior Movement capability.	
111-3102	The 2S6 Air Defense Battery capability, for the Conduct A Tactical Road March order, shall send a "start of tactical road march" report on the battalion radio network when the order execution begins.	D
111-3103	The 2S6 Air Defense Battery capability, for the Conduct A Tactical Road March order, shall send a "completion of tactical road march" report on the battalion radio network when the order execution completes.	D
HVY-1505 Occupy Firing Position		
111-3201	The 2S6 Air Defense Battery capability, for the Occupy Firing Position order, shall use the following parameters: a. defensive position to be occupied (point) b. direction of expected air attack	I
111-3202	The 2S6 Air Defense Battery capability, for the Occupy Firing Position order, shall permit GUI designation of the defensive position to be occupied, as a point on the PVD. Note: This shall be a required input on the GUI (no default.)	D
111-3203	The 2S6 Air Defense Battery capability, for the Occupy Firing Position order, shall permit GUI designation of the direction of expected air attack, by selection of a point on the PVD. Note: This shall be a required input on the GUI (no default.)	D
111-3204	The 2S6 Air Defense Battery capability, for Occupy Firing Position order, shall provide parametric data for the following: a. platoon position width (default of 250 meters) b. platoon position separation (default of 150 meters) c. setback angle (default of 45 degrees) d. firing position proximity (default of 1 km)	I
111-3205	The 2S6 Air Defense Battery capability, for Occupy Firing Position order, shall compute a defensive position line of parameterized "platoon position width" length for each platoon. Design note: See the Conceptual Model for specification of the location and orientation of the platoon position lines.	D
111-3206	The 2S6 Air Defense Battery capability, for Occupy Firing Position order, shall execute the Common Threat Behaviors Occupy Defensive Position capability for each platoon, passing the following parameters: a. defensive position = platoon position line b. enemy direction = expected direction of air attack	D
111-3207	The 2S6 Air Defense Battery capability, for Occupy Firing Position order, shall set the fire permission to "free" for all vehicles in the battery.	D
111-3208	The 2S6 Air Defense Battery capability, for Occupy Firing Position order, shall send a "in position" report on the air defense radio network when all vehicles have arrived at their designated firing positions.	D
HVY-1507 Engage An Aerial Target		
111-3301	The SA-16 Air Defense Platoon capability, for the Engage An Aerial Target order, shall utilize the following ModSAF VAssess parameters	D

	for the SA-16 missile launcher weapon's threat priorities of aircraft types (with decreasing priority): a. ground attack aircraft with anti-tank weapons b. other ground attack aircraft c. electronic countermeasures aircraft d. all other aircraft	
HVY-1508 Employ Target Acquisition Radar		
111-3401	The 2S6 Air Defense Battery capability, for the Employ Target Acquisition Radar order, shall permit GUI designation of the selected unit's search sector mode as one of the following: a. 360 coverage b. segmented coverage Note: "360 coverage" indicates the platoons will have a 360 degree search sector, whereas "segmented coverage" indicates each platoon has a distinct search sector. The default is "360 coverage."	D
111-3402	The 2S6 Air Defense Battery capability, for the Employ Target Acquisition Radar order, shall permit GUI selection of a unit from a unit hierarchy display widget. Note: This permits selection of the battery and platoon units for subsequent editor operations.	D
111-3403	The 2S6 Air Defense Battery capability, for the Employ Target Acquisition Radar order, shall permit GUI designation of the center of a search sector for the selected unit.	D
111-3404	The 2S6 Air Defense Battery capability, for the Employ Target Acquisition Radar order, shall permit GUI designation of the search sector width for the selected unit.	D
111-3405	The 2S6 Air Defense Battery capability, for the Employ Target Acquisition Radar order, shall provide parametric data values for the following: a. search mode (default of "360 coverage") b. sector center (default of vehicle center of 0 degrees) c. sector width (default of 90 degrees)	D
111-3406	The 2S6 Air Defense Battery capability, for the Employ Target Acquisition Radar order, shall set each vehicle's radar search sector based upon the following parameters: a. search mode b. sector center c. sector width	D
111-3407	The 2S6 Air Defense Battery capability, for the Employ Target Acquisition Radar order, shall execute as a background task when the following CISs are executed: a. HVY-1504 Conduct Tactical Road March b. HVY-1505 Occupy Firing Position c. HVY-1510 Provide Air Defense Coverage Design Guidance: Background execution is specified in ModSAF's "taskframes.rdr" file.	D
HVY-1510 Provide Air Defense Coverage		
111-3501	The 2S6 Air Defense Battery capability, for the Provide Air Defense	D

	Coverage order, shall permit GUI designation of a defensive position as a point.	
111-3502	The 2S6 Air Defense Battery capability, for the Provide Air Defense Coverage order, shall permit GUI designation of an enemy direction.	D
111-3503	The 2S6 Air Defense Battery capability, for the Provide Air Defense Coverage order, shall execute the HVY-1505 Occupy Firing Position order, passing the following parameters: a. defensive position b. enemy direction	D

3.1.11 Classified Threat Database Capability

The Classified Threat Database Capability presents requirements for a classified (Secret level) ModSAF database characterizing all the threat platforms modeled in ModSAF, as well as new threat platforms to be added to ModSAF under this effort.

Requirement Number	Classified Threat Database Capability Requirements	Qualification Method
???-001	<p>The 2S6 Classified Threat Database Capability shall incorporate classified data files characterizing the platforms, turrets, sensors, weapons, radios, laser designators, and attachments, as required to support ModSAF physical system and component models, for the following existing ModSAF combat vehicles and dismounted weapons:</p> <p># Fixed Wing Aircraft Su-25 MIG-27 Flogger D MIG-27D Flogger J-1 MIG-29 Fulcrum</p> <p># Rotary Wing Aircraft Mi-24 helicopter Mi-28 helicopter Mi-8 helicopter Ka-50 Hokum helicopter</p> <p># Trucks Ural-375 cargo carrier Ural-375 fuel carrier ZIL-131 FDC truck</p> <p># Tanks T80 Battle Tank T-72 main battle tank</p> <p># Personnel Carriers BMP-1 personnel carrier BTR 80 BMP-2 personnel carrier</p>	I

	<p>1V13 SP Artillery Battery Fire Direction Center 1V14 SP Artillery Battery Commander's Command Observation Post 1V15 SP Artillery Battalion Commander's Command Observation Post 1V16 SP Artillery Battalion Fire Direction Center ACRV recon command post BTR-60PU Towed Artillery Btry & Bn Cdr's Command Observation Post BRDM2 recon vehicle BMP2 configured as a FAC ZIL131 configured as a FAC</p> <p># Soviet Rocket Launchers BM21, a 122mm MLRS (Multiple Launch Rocket System)</p> <p># Mortars 2B11 120mm towed mortar 2S12 120mm towed mortar</p> <p># Howitzers 2S1 122mm howitzer 2S19 152mm howitzer</p> <p># Anti-Aircraft ZSU-23-4M AA gun 2S6 air defense vehicle SA-9 AA Missile with Armored Wheeled Launcher SA-15 AA Armored Tracked Launcher XM375S command vehicle -- air defense PCV XMG1S command vehicle -- air defense SCV SA_6 fire control radar -- air defense FCR SA_6 missile transporter, erector, launcher -- air defense TEL XMTSS Acquisition Radar -- air defense ACQ XMLTS Height finding radar -- air defense HFR</p> <p># Dismounted Infantry AKM Avtomat Kalashnikov assault rifle RPK-74 machine gun USSR DI with a SA-16 AGS-17 automatic grenade launcher Spigot (AT-4) missile launcher RPG-18 bazooka</p>	
???-002	<p>The 2S6 Classified Threat Database Capability shall incorporate classified data files characterizing the platforms, turrets, sensors, weapons, radios, laser designators, and attachments, as required to support ModSAF physical system and component models, for the following new ModSAF combat vehicles and dismounted weapons:</p> <p>RPG-22 AT Launcher AL JALEEL 120mm SP Mortar</p>	I

	ASTROS II SP HVY MRL GHN-45 155mm Towed Gun/Howitzer	
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3.2 Capability External Interfaces

The capabilities developed for the ModSAF Threat Enhancement effort will all utilize typical external interfaces (i.e. DIS 2.0.3 PDUs and ModSAF's POP PDUs) to ModSAF. All behaviors developed as part of this effort will be designed and implemented within the standard task/taskframe ModSAF behavior architecture, and will support access and modification of behavior parameters through standard task Persistent Objects.

3.3 Adaptation Requirements

The following goals concern customizable data parameters which do not require recompilation of ModSAF software to alter values.

Adaptation Design Goals:

1. For a developed behavior, all behavior constants will be embedded in data files associated with the vehicles executing the behaviors.
2. For a developed behavior, default values for all behavior constants will be assigned by the code in the event that values are not provided in the appropriate data files.

3.4 Security and Privacy Requirements

All tactical behavior modeling will be performed at the unclassified level.

3.5 Capability Environment Requirements

The capabilities described in Section 3.1 will operate in the standard ModSAF environment. No new environment requirements will be required to operate ModSAF.

4. Requirements Traceability

This SRS can be traced to the following conceptual model:

- Document Control No.: ADST-II-MISC-MODSAF-9700341
- Document Title: "ModSAF Threat Enhancement Final Report - Appendix A: Conceptual Model"

This SRS can be traced to the following system requirements:

- ???: Threat Database
"The contractor shall ..."
- 111: New Threat Units
"The contractor shall..."

- 222: Threat Unit Enhancements
“The contractor shall...

5. Notes

Acronym List

ADST	Advanced Distributed Simulation Technology
ATGM	Anti-Tank Guided Missile
CATT	Combined Arms Tactical Trainer
CDRL	Contract Data Requirements List
CIS	Combat Instruction Set
CSA	Configuration Status Accounting
DIS	Distributed Interactive Simulation
FAS	Feasibility Analysis Study
GUI	Graphical User Interface
ModSAF	Modular Semi-Automated Forces
MRL	Multiple Rocket Launcher
NAWCTSD	Naval Air Warfare Center Training Systems Division
PDU	Protocol Data Unit
POP	Persistent Object Protocol
RPG	Rocket Propelled Grenade
SA	Surface-to-Air
SAM	Surface-to-Air Missile
SRS	Software Requirements Specification
STRICOM	Simulation, Training and Instrumentation Command